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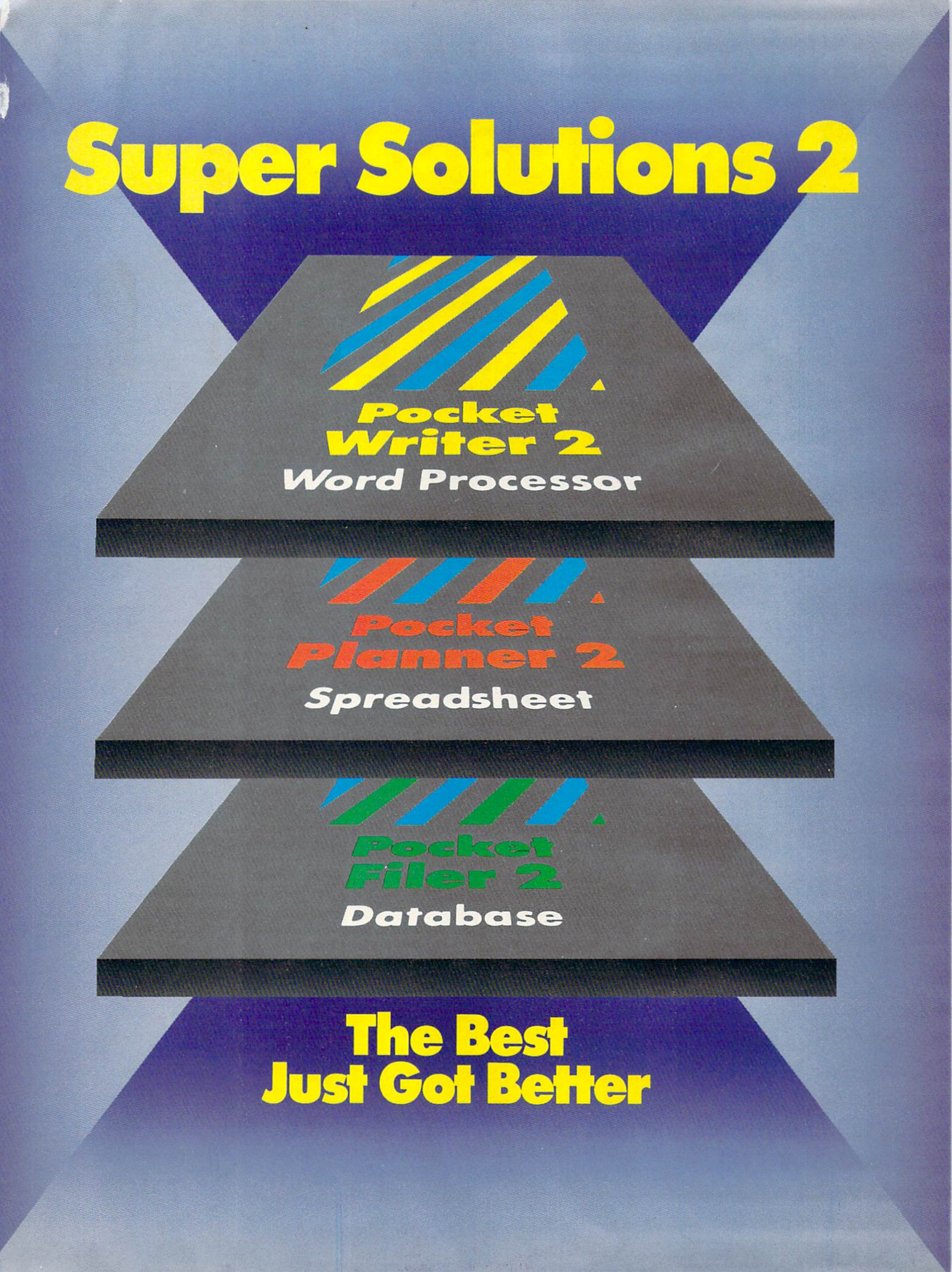
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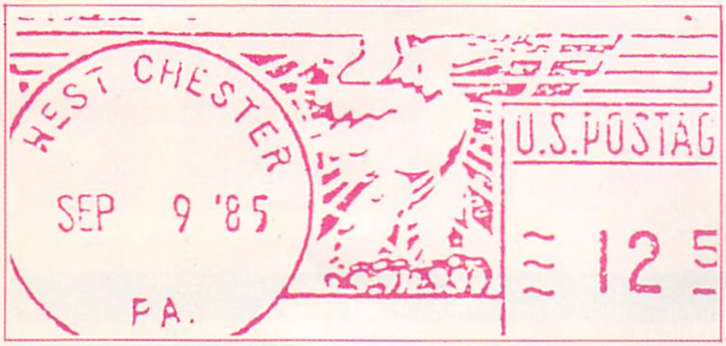
FEATURES





DEPARTMENTS

LETTERS



Where in the World Is Carmen Sandiego?

To the Editor:

As a frequent international traveler, I read with interest your review of *Where in the World Is Carmen Sandiego?* in the January, 1987, *Commodore Magazine.* However, I was surprised to see on the screen reproduced on page 20 a reference to Istanbul as the capital of Turkey. As you may know, the capital of Turkey was moved to Ankara in 1923.

Undaunted, and on the recommendation of my local Commodore dealer, I purchased the game and was reassured to find that Istanbul is no longer described as the capital of Turkey. Perhaps someone else noticed this error and corrected the program.

I find that playing a private eye and tracking down the V.I.L.E. gang most entertaining, and am sure that playing this exciting and educational game will heighten my nine year-old daughter's knowledge of and interest in international geography and facts from the *World Almanac,* as well.

Thank you for printing the review.

Randolph Harris
Washington, D.C.

[Editor's Note: Broderbund has now released *Where in the USA Is Carmen Sandiego?* for the Commodore 64. A sequel to *Where in the World Is Carmen Sandiego,* this educational adventure game takes place in all 50 states. It retails for $39.95.]

Don't Panic—Yet

To the Editor:

Gary V. Field's article "Don't Panic—Yet" in the February, 1987, issue was right on target. A copy of the article should be enclosed in every Commodore computer sold. It's a solid piece of informative writing.

I think he should have taken the Pre-Panic Check-List #6 one step further. On one occasion, the FILE NOT FOUND message was all I could get trying to load ten programs that I knew were alright. A call to a user group member brought the suggestion to type OPEN 15,8,15:PRINT #15,"IO":CLOSE 15.

This command worked (revalidated drive)! The head had gotten stuck in a position that wouldn't allow it to read a disk.

Donald A. Schaaf
McCook, Nebraska

Geneology for the PET

To the Editor:

Several years ago we developed a genealogy program for the Commodore 64. It went over quite well and we soon added the Plus/4 to our supported computers. With the advent of the 128, we quickly added a version for that computer, as well. Now with the Amiga available, we have begun to develop a program for it as well.

Having progressed continuously forward with the latest from West Chester, we now find ourselves going back in time and developing for the PET series of computers. While everyone else is forgetting the PET and drooling over the Amiga, we find ourselves rediscovering how good a computer the 8032 is.

As a result, we at Byteware are pleased to announce that we now offer the *Genealogist* for the PET computers. We are able to supply the program in 4040 or 8050 format.

A stamped self-addressed envelope to the address below will get interested genealogists information, sample sheets and prices for the various programs. Prices start at $9.95.

Robert Cokel, President
Byteware
Maple City Software
906 West 6th Avenue
Monmouth, IL 61462

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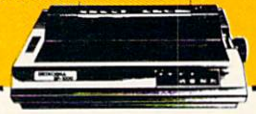
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With TecTrans' Two-Computer Adapter, you can share one printer with two computers. Simply connect the interface (part number 2C/C/00) and the printing computer blocks the other computer if it also tries to send data to the printer. When the first computer stops send ing data, the other computer gets access to the printer. There is no data loss. The switch is built in the cables and adapts to the printer.

The connectors have two parallel (Centronics-type female) input and one parallel (Centronics-type) output. The interface gets its power from pin 18 of the printer or from a separate power supply (optional).

The interface includes two cables to the computers and retails for $99 plus $4 for handling. (TecTrans, 6925 Rosemead Boulevard, San Gabriel, CA 91775, 818-285-3121)

Portability across Computers

MicroMotion has released **MasterForth** for the Commodore 64, which lets Forth programs written for one computer run unchanged on others.

MasterForth provides a complete programming environment, including a macro-assembler and a full file interface. Relocatable utilities and transient definitions make it possible to run substantial software packages even in a limited memory environment. The string package, screen editor and resident debugger are standard features. Programs can also be optimized with the optional target compiler. **MasterForth** matches the Forth-83 standard dialect described in **Mastering Forth** (Brady, 1984), which is included in the package. (MicroMotion, 8726 S. Sepulveda Boulevard #A171, Los Angeles, CA 90045, 213-821-4340)

The Computer Channel

The Computer Channel delivers the best in computer entertainment, adventure, information and educational programs to your home via the local cable TV system. It is available 24 hours a day at no additional charge to basic cable users, and all that is needed is a home computer, basic cable TV and the Computer Channel Interface. The interface is available for $49.95 from your cable system, local computer store or direct from The Computer Channel.

The Computer Channel features entertainment (board games, chess, card games, adventure games, detective mysteries, arcade games, flight simulations, computerized sports, trivia games); education (math game exercises, vocabulary improvement, cooking programs, college entrance preps, coloring books, cookbooks); community bulletin board; linkage to data bases like CompuServe, The Source, Dow Jones, Western Union and MCI; informational services (tax preparation, legal advisor, financial news, home finance, medical emergency, national news, local news, weather, sports, yellow pages, TV guide); business applications; utility programs; home shopping; reservations (restaurants, concerts, camp sites, theaters); home banking; and a travel channel.

(The Computer Channel, 1655 Silverwood Terrace, Los Angeles, CA 90026, 213-663-8239)

U.S. Strategic Defense Initiative

In Cosmi's **Def Con 5** for the Commodore 64, your computer is linked to an existing SDI (Strategic Defense Initiative) system. You control 16 orbiting visual reconnaissance satellites which provide 23 different geostationary and closeup maps of the earth's surface.

Through an intricate series of command and operator control functions, you bring your SDI System into action to defend against incoming ballistic missiles. You must use weapons that include ground-based chemical lasers, orbiting laser reflectors, free-electron lasers, neutral particle beams, electro-magnetic launchers, nuclear-pulsed x-ray lasers, anti-space mine robots, decoy deployment detonators, and multi-track thermal target interceptors.

Def Con 5 retails for $19.95. (Cosmi, 415 Figueroa Street, Wilmington, CA 90744, 213-835-9687)

128 Programming Secrets

Commodore 128 Programming Secrets by William M. Wiese, Jr., is Osborne/McGraw-Hill's latest book for programmers who want to create their own software for the 128.

All 128 operating modes are described in detail so readers can learn to program in all modes. Wiese explains concepts through numerous hands-on programs. Readers learn how to use Kernal ROM and BASIC 7.0 ROM to run faster programs and how to gain greater control over screen display with video RAM, as well as how to apply bank-switching tricks to store and access additional programs in extra memory banks.

Wiese also discusses CP/M BIOS mapping so programmers can take advantage of the CP/M mode; the development of advanced text, graphics and sound applications; the use of memory management techniques for efficient programming; and control of the 128 disk and input/output operations for a greater variety of programming applications.

The book retails for $15.95. (Osborne/McGraw-Hill, 2600 Tenth Street, Berkeley, CA 94710, 415-548-2805)

Money-Back Guarantee Offered with Accelerated Reading Program



Readup Inc. is now offering a one-year money-back guarantee on **Accelerated Reader,** a reading enrichment program for the Commodore 64 in a classroom environment. If students using the **Accelerated Reader** are not reading more books within the first year, the program cost will be refunded. The program is suitable for ages 8 through 18 and can be used by children of varying reading abilities.

To use the program, a student selects a book from the 3-part 150- book **Accelerated Reader** book list, reads it, then goes to the the computer to test comprehension of the book. The program scores the test and accumulates results for each student and for the class as a whole.

The complete package includes the teacher's master disk, a backup disk, four testing disks, book list, reading chart, registration and warranty card, and a fully indexed manual. The program will also accept new books and test questions entered individually.

Accelerated Reader retails for $300. (Readup Inc., P.O. Box 95, Port Edwards, WI 54469, 715-887-2333)

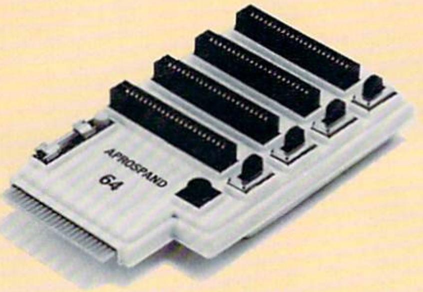
Transfer 64 and 128 Files to AmigaDOS

Central Coast Software announces **Disk-2-Disk,** a transfer utility that transfers SEQ, REL and USR files to the Amiga.

Disk-2-Disk supports the 1541/4040 and 1570/1571 disk formats including 1541 "flippies." It converts Commodore-PET ASCII to AmigaDOS standard ASCII and vice versa. **Disk-2-Disk** formats 1541 and 1571 disks, runs under either the Intuition or CLI interfaces, supports AmigaDOS-style wild cards in filenames, provides duplicate filename detection with query/replace options, provides TYPE and DELETE commands, and permits renaming of files where filename restrictions occur. **Disk-2-Disk** also includes VALIDATE BAM and CHECK DISK utilities as well as a BASDIF utility to find and flag dialect differences in BASIC files.

It retails for $49.95. (Central Coast Software, 268 Bowie Drive, Los Osos, CA 93402, 805-528-4906)

Cartridge Expander



Aprospand-64 is a four-slot expander for the Commodore 64, Plus/4 and 128 which allows the installation of up to four cartridges to be used independently or in any combination. Aprospand-64 also has a reset switch allowing a restart without having to turn the computer off and then back on again. Also, the computer's power line to the cartridges is fused to protect the computer from faulty cartridges.

It comes with a one-year parts and labor warranty. Retail price is $33. (Aprotek, 1071-A Avenida Acaso, Camarillo, CA 93010, 805-987- 2454)

Strum Along Songs

DJ Software, publishers of **Easy Guitar,** has released **Strum Along Songs, Beatles Classics** for the Commodore 64. **Strum Along Songs** allows you to play songs accompanied by a simulated rhythm section (bass and drums). You can develop sight reading by observing the melody notes on the music staff or learn bass and drum techniques by watching the on-screen drum and bass playing. You can also improve your chord and strumming technique.

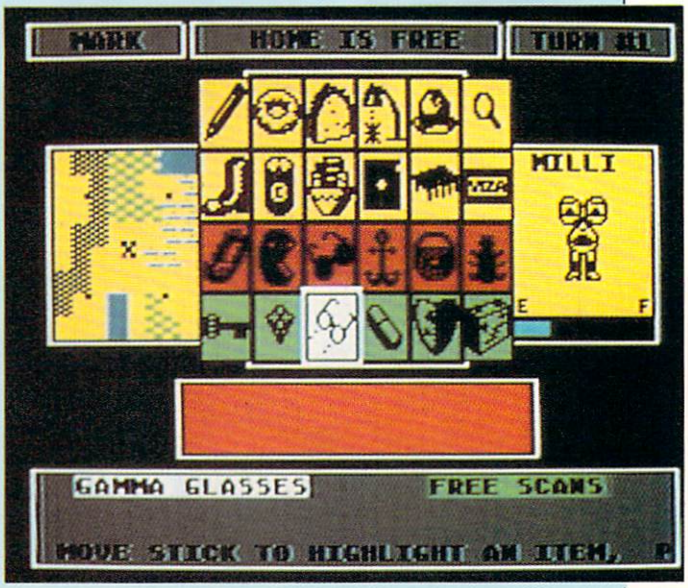
Strum Along Songs and **Easy Guitar** are available from DJ Software for $29.95 each or both for $45, plus $3 for shipping. (DJ Software, 10636 Main Street Suite 414, Bellevue, WA 98004, 206-883- 9257)

REVIEWED BY GARY V. FIELDS

Robot Rascals

Computer: Commodore 64
Publisher: Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
Medium: Disk
Price: $39.95

If you're looking for a game the family can play together, Robot Rascals *is it.*



Robot Rascals is a game with a refreshing difference: It is an electronic scavenger hunt for two to four players that uses two decks of cards. Its designer, Dan Bunten, created a somewhat similar game called *M.U.L.E.,* and *Robot Rascals* picks up where that game left off. While the first game was rather involved and appealed primarily to young adults, this game is so simple to control that even young children can play it.

Two features of *Robot Rascals* attracted me to it. First, it is easy to learn the game rules as well as control the screen robots. Because of this, the game quickly became a favorite of my five year-old son. That brings me to the second feature—it is a group participation game. In other words, you must play it with other *people*, not the computer.

Before the competition begins, each player chooses which robot they will control, what color it will be, and how much energy it will possess. By selecting different energy levels, adults and children can compete as equals. This system makes it possible to seriously compete with younger players.

I was pleased to discover that there were no death rays or deadly traps involved in *Robot Rascals*. The closest thing to violence is the ability to steal items from another robot. And all you do to do this is to bump into an opponent (assuming you have enough energy) and take what you desire.

The cards are drawn from a deck before and during play and combine with randomly-selected screen commands to change the flow of the game. One deck of cards assigns each player the items their robot must locate to win the round and the other deck causes the players to shift objectives during play. For instance, at the beginning of play you may need the Helpless Handbag, Energy Eater and Transistor Taco to win, but by the finish you may need an entirely different set of objects. This shift prevents any player from winning too quickly.

Although the game comes with two sets of cards, they are not required to play the game. Instead, they can be used to add some unusual wrinkles to the competition. My five-year-old son and I normally ignore the cards when we play, but use them if the family gathers for a round.

Each player takes turns (the computer keeps track of who's next) searching the landscape for the items required to successfully complete the scavenger hunt. You use your energy to do a variety of things, which are all activated by a joystick. Because action is broken into turns, only one joystick is necessary.

I found that by dividing the action into turns, as one player takes their turn, the others sweat it out. Will he or she steal treasures, pass a disaster card, find all of his or her items and go home? Or will he or she break down in a swamp or rocky place and give the next player a chance?

The screen display shows an overall view of the territory the robots can explore and where trees, rocks, water, swamps, bases and teleport terminals (terminals can be used to get around quickly) are located. A smaller window shows the activated robot and its surroundings while another shows the robot's energy level.

As the robot moves (each robot has a unique shape and moving action), sound is generated. The robot can be commanded to move, scan the area around him, steal from another player, or quit. Each activity except quit costs the robot energy. The trick is to get to where you're going, scan for objects, then pick them up while using as little energy as possible.

Unlike other games, the winner here is not selected by the computer. Just as in a board game, the first player to find all of his or her objects and get to home base is the winner. But the other players can examine the cards the winner is holding and either agree or disagree. If the winner is short of the required objects, he or she is returned to the playing field. But if he or she really is the winner, his or her robot expands and dances around the screen. My five year-old's greatest delight is watching his robot perform the winner's dance while I read the flattering message—he loves beating his dad.

The manual is 20 pages long and needs to be read only once before play can begin. Actually, my son and I had the game up and running and were having fun with the robots before we even looked at the manual. I only consented to read it after the rest of the family joined in and insisted on playing by the rules.

Continued on pg. 115



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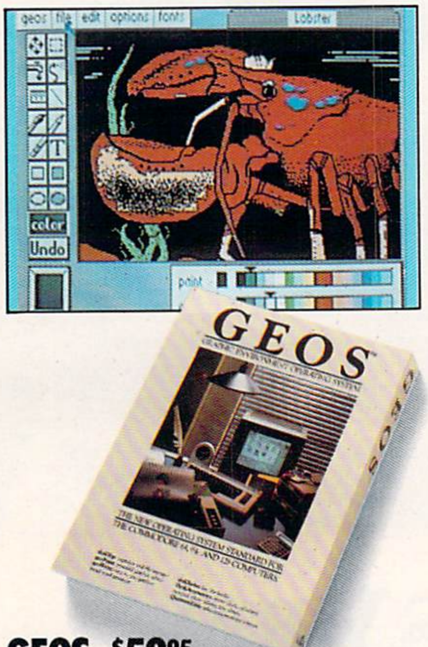
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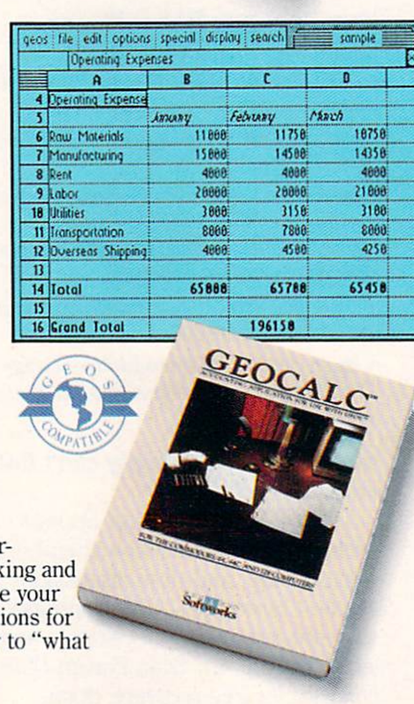
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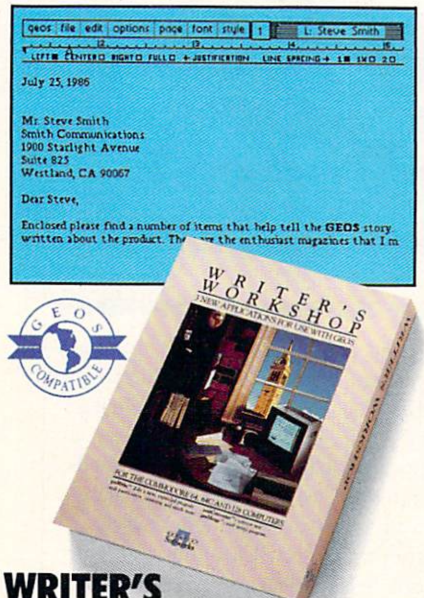
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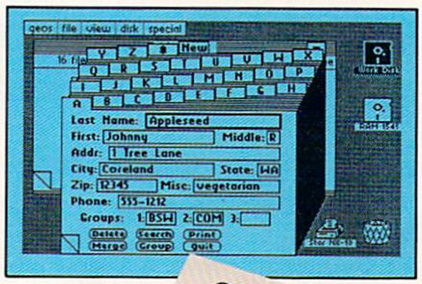


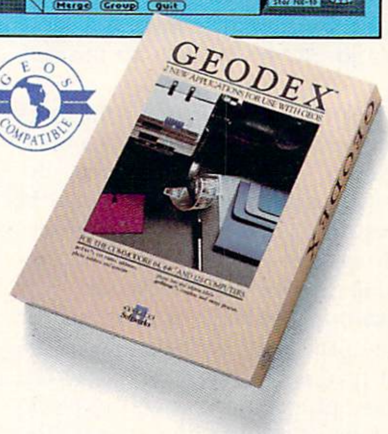
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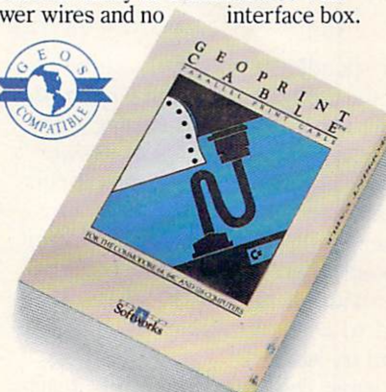
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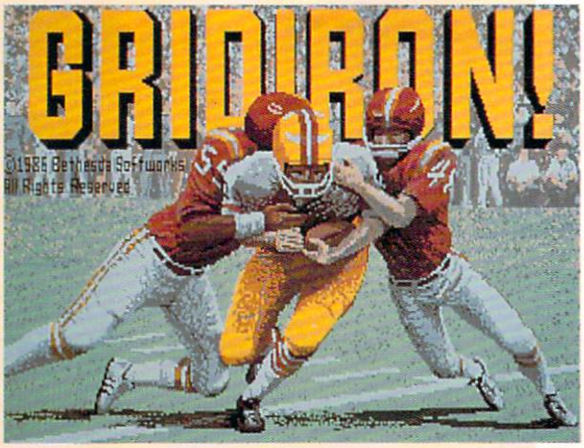
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REVIEWED BY GARY V. FIELDS

Gridiron!

Computer: Amiga (512K)
Publisher: Bethesda Software
P.O. Box 1665
Bethesda, MD 20817
Medium: Disk
Price: $69.95

The sounds heard here are digitized sounds recorded during an actual game— you hear real cheers, and when the players collide, you hear real grunts.



After spending a couple dozen hours testing the football simulation *Gridiron!*, I suspect I've finally found a game I will never allow to die from neglect. However, it may die from abuse—I've been tempted many a time to use it for a frisbee after losing to the computer's team and those "blind" officials. But being an Atlanta Falcon fan for 20 years, I've learned to control my temper and just sigh and try again.

The game, though rather simple in appearance (the player's view is from above and football players are displayed as filled circles), really does employ the Amiga's power well. The sound effects of the game are realistic and the game controls are extremely simple (either mouse or joystick can be used).

To recreate the grunts, cheers and sideline sounds of a game, Bethesda reproduced the sounds from a real NFL game. The sounds heard here are digitized sounds recorded during an actual game—when the crowd cheers, you hear real cheers, and when players collide, you hear real grunts.

The game can be played solo (against the computer) or against another human. Either selection is a challenge and neither guarantees that you will win or lose—that is decided by your abilities. Thankfully, unlike in too many other simulation games, the computer is beatable in *Gridiron!* (at least at the novice level).

Because *Gridiron!* has several degrees of difficulty ranging from practice to pro, no one need walk away from the game in frustration every time they play. By working your way up from practice (the defense is very timid) to pro (don't attempt this unless your last name is Lombardi), you can play on a level which is always challenging, but not necessarily impossible. These different difficulty levels are one of the things which makes *Gridiron!* so attractive. I've tried to get my hands on every football simulation marketed for the Commodore systems, but until *Gridiron!*, all were either too basic, too advanced, too difficult to manage, too slow, or too boring.

One especially nice feature is the three time options. You can break play into either 5-, 10- or 15-minute quarters. Because there is no option to save a game in progress, I usually sneak in a five- or ten-minute quarter game workdays and reserve full games for the weekends.

Gridiron! captures and recreates the feel and play of the real sport. The field action here is real time. The on-screen men are properly sized and move in proper proportion to the screen. The teams are fully manned: Each team has 11 individually-controlled players. The delays between plays are accurate and fast. An on-screen clock ticks down the game clock, and failure to execute a play before the clock zeros results in a delay-of-game penalty. Both the offensive and defensive plays are pulled right out of a coach's playbook and can be easily employed or redesigned. The game plays just like a real game, right down to the toss of the coin, which decides which team gets the ball first, and the inclusion of penalties for everything from illegal motion to pass interference. (I really hate it when my team is flagged for unnecessary roughness. Heck, that's what the boys are paid to do.)

After each quarter of play or during time outs, you can view both your own and your opponent's stats. This shows how many yards each has gained, punt return percentages, pass completion ratios, fumbles, and so on. The number of running and passing yards each side has accomplished is also displayed between each play. This information is invaluable to picking the proper defense, since if your opponent has racked up more yards in the air than on the ground, chances are in a tight situation he will attempt a pass rather than a run. Out-guessing your opponent here is just as important and dangerous while playing *Gridiron!* as it is during a real game. But having the statistics makes calling a play a little less like blind luck.

Because the entire game is loaded into the computer at the start, there are no delays during the game while the computer's memory is updated. But because the program is huge, it takes several minutes to load and requires an Amiga with at least 512K.

During the action, you, as player/coach, do two things. First you pick the defensive or offensive play (yes, you can call audibles at the line), then you directly control one of the men on the field. On defense you can play any position, but on offense you are always the player carrying the ball. Thus, on offense you will begin as the quarterback, but control will switch to a back or receiver if the ball is handed off or thrown.

The quick, natural response of the mouse and logical game interface makes executing plays easy, and the action flows smoothly (you can use a joystick if you prefer, but this is one game which is perfect for the mouse). I was delighted with the realistic timing and control involved. You can even fake a defender out of his shoes if you quickly shift your an-

Continued on pg. 113

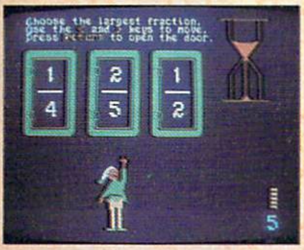


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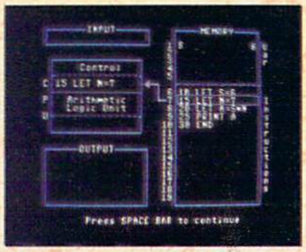


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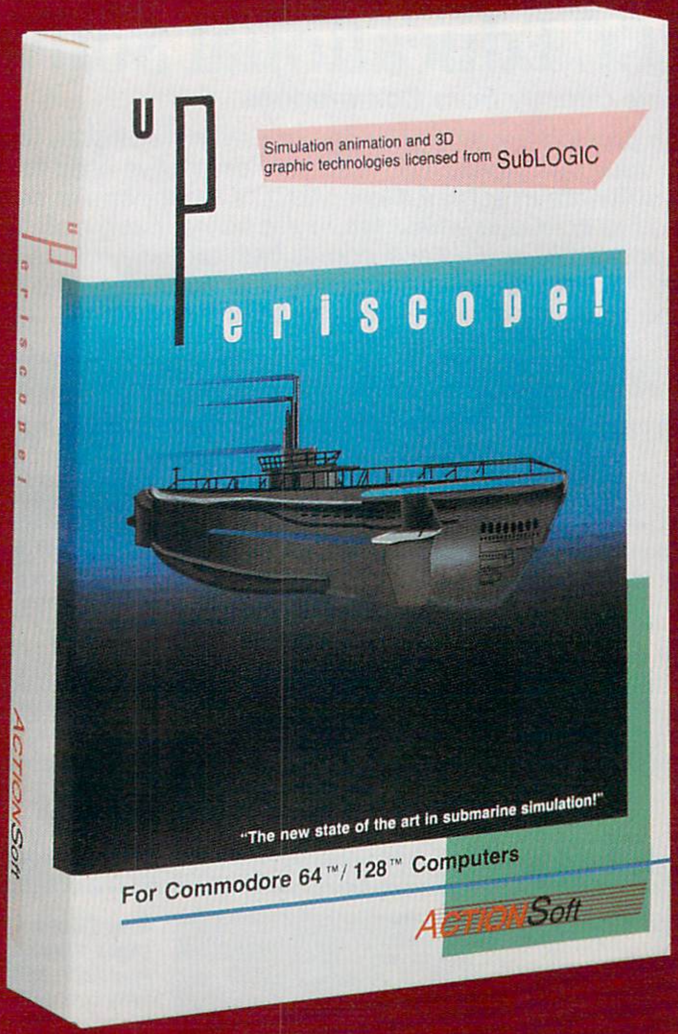
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ON RIGHT OUT OF THE WATER!







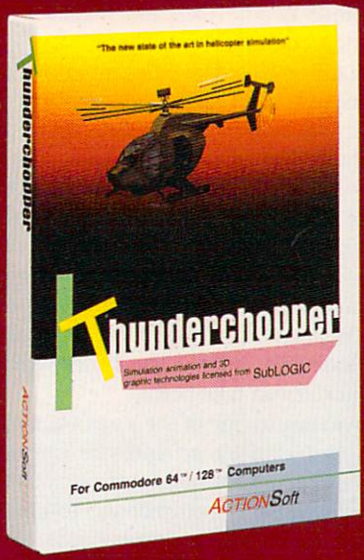






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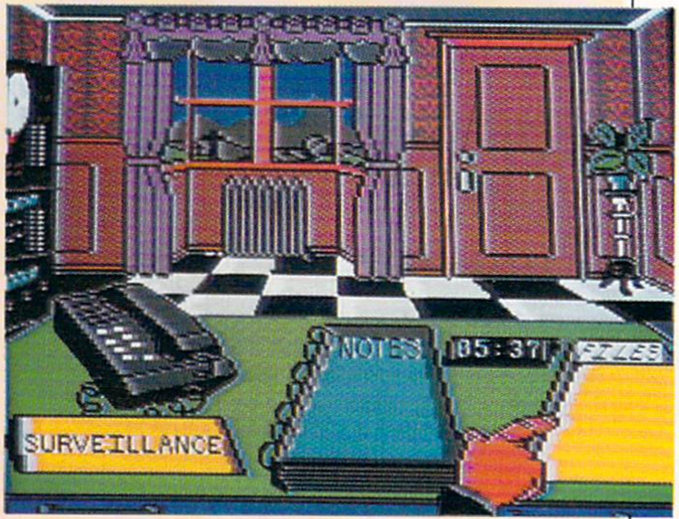
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REVIEWED BY BOB GUERRA

Killed Until Dead

Computer: Commodore 64
Publisher: Accolade
20833 Stevens Creek
Boulevard
Cupertino, CA 95014
Medium: Disk
Price: $29.95



Make just one mistake concerning any aspect of the case, and a bomb dropped through your office window will take you off the case permanently.

Billed as "the first genuinely interactive murder mystery game," Accolade's *Killed Until Dead* puts you in the role of detective Hercule Holmes. Your assignment: to prevent a murder by figuring out the victim, killer, weapon, location and motive. After selecting one of the game's 21 mysteries, you proceed directly to your desk at the Gargoyle Hotel where the suspects, five of the world's greatest mystery writers, have met for their annual reunion. You have only 12 hours to solve the mystery—and you're not allowed to leave your desk. Fortunately, it's a well-equipped desk.

In addition to a digital clock to keep you abreast of the remaining time, your desk is also home to your suspect files, notebook, telephone and surveillance equipment, all of which are accessed using a joystick-controlled hand. Your suspect files provide you with interesting and often humorous background information on each of the five suspects—Mike Stammer, Agatha Maypole, Lord Peter Flimsy, Claudia Von Bulow and Sydney Meanstreet. By reading through them, for example, you can learn that Claudia is fond of deposed dictators, or that Sydney enjoys opera, ballet and mud wrestling.

After you've read through the files, you can use your surveillance equipment to break into one of the suspects' rooms. Before gaining entrance, however, you must correctly answer a multiple-choice question relating to detectives and mysteries. Here, you might be asked to name Dashiell Hammett's other profession, or the star of *Murder She Wrote.* Answer correctly and you're in. Blow it and a security guard makes sure you don't try to break into that room again for ten game-minutes.

By getting into the suspects' rooms, you'll find valuable clues and may even discover when and where two of the suspects are scheduled to meet one another. You can then eavesdrop on the meeting by remembering to monitor it at the right time, or, if you have another meeting to listen in on at the same time, you can pre-set your tape recorder to attend the meeting for you. All of the information you gather from your break-ins, monitoring, recording and phone conversations is automatically logged into your notebook.

Once you begin digging up some incriminating information on each of the suspects, you can start calling them on the phone and questioning them. To ask someone if they think the murder will be committed using poison, for example, you simply highlight the appropriate question and select the specific weapon from a short list. In all, there are five possible weapons that might be used and nine locations around the hotel where the murder can take place.

As you talk to one of the suspects, their face appears on-screen and you can tell by their reactions whether or not you're on to anything. If you manage to crack the case by midnight, you can call your prime suspect and, if your theories are correct, force a full confession. Make just one mistake concerning any aspect of the case, however, and a bomb dropped through your office window will take you off the case permanently.

As usual, Accolade has done a terrific job with the graphics and sound. As the midnight deadline approaches, the sky outside your office window gradually darkens and strange eyes occasionally peek in. Every once in a while a fly buzzes through the room before being gulped down by a Venus Fly Trap on the plant stand by your door. In addition to the game's theme music, which is a cross between the *Pink Panther* and *Get Smart* themes, each of the five suspects also has their own theme music that you hear when you call them on the phone. In each case, the music is appropriate and adds a lot to the mood of the game.

If *Killed Until Dead* has a fault, it may be that even some of the mysteries from the Super Sleuth category are too easy, and eventually you'll solve all 21. Since the mysteries are all loaded from the flip side of the program disk, however, it seems possible that additional mystery disks could be made available at some time in the future. If not, *Killed Until Dead* will eventually fail to hold your interest, like a good mystery novel that you've already read. ▣

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REVIEWED BY MARK COTONE

The American Challenge: A Sailing Simulation

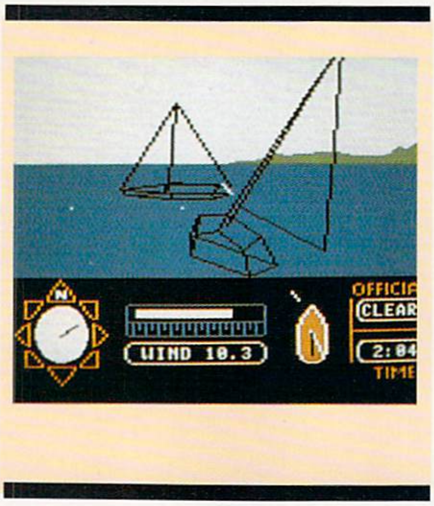
Computer: Commodore 64
Publisher: Mindscape
3444 Dundee Road
Northbrook, IL 60062
Medium: Disk
Price: $29.95

I don't know about you, but I really didn't appreciate all those Aussie sailors having their day at our expense. Ever since 1983 when the *Australia II* yacht used its cloaked underbelly to nip our *Liberty* ship in the seventh and deciding race of the America's Cup, I've been looking for revenge—impatiently counting the days until the U.S. crew would force those mates from down under to relinquish that prestigious trophy and return it to its rightful owners.

When *Stars and Stripes* skipper Dennis Conner crushed the *Kookaburra III* with a dramatic shutout victory in February of 1987, I thought my antagonistic emotions would subside. But it was no use. I would not be satisfied until I could personally avenge that earlier loss. Well, with Mindscape's new release, *The American Challenge: A Sailing Simulation*, my day at the races has finally come.

The setting is Silicon Bay, a fictitious coastal inlet with true-to-life conditions. A relentless northern wind whips across the water, occasionally rushing and dropping with surprising gusts and lulls. An ever-changing series of powerful currents cause havoc beneath a seemingly tranquil sheet of water, invisibly pushing and pulling with startling strength. And off in the distance, buoys stand attentively at preset marks, outlining the match that's about to begin.

Your racing ship is anchored nearby; a single-sail yacht whose rudder, sail and centerboard are all linked to various keys on the computer. When the 12-meter dual commences, the seaworthy helmsman will manipulate the position of these three components—shifting the sail in



and out, moving the rudder left and right, and raising the centerboard up and down—trying to harness the force of the wind to propel his vessel around the bay in the quickest time.

As expected, the ultimate goal in *The American Challenge* is to defeat the defending Australian champion in the famed Cup race. But this opportunity is not open to all comers. To even qualify for the chance to go bow-to-bow against the best, you must first prove your worth in seven different qualifying trials, each one more difficult than the last. Starting on a short current-free beginner course against a mild opponent and working your way through the longer runs opposite the stronger competition, these preliminary races will slowly sharpen your sailing skills while conditioning you for that formidable final test.

The American Challenge's game screen offers just about everything needed to transform a landlubber into a seasoned sailing captain. The bottom third of the screen houses your instrument panel, where all the vital elements of the ship and sea are translated into recognizable form by an assortment of gauges and dials. Here, your compass, sail and centerboard position indicator, speed band, wind gauge and digital race timer are all presented in an uncluttered easy-to-monitor display. Above this on the remaining two-thirds of the screen is an unadorned linear representation of your boat and its surroundings. It's here that you get to witness the direct consequences of your skippering decisions. A full range of options are available to let you track your vessel from any number of different water level vantages.

Anyone with any experience at the helm of a real sailboat knows just how tough it can be to deal with a power source as predictably unpredictable as the wind. In this area, the Mindscape simulation is right on target, accurately recreating the frustrations that arise when dealing with this obstacle. Uninitiated captains will probably find their task a little more involved than first imagined. But that's no reason to abandon ship, for this package comes with more than its share of orientation tools to help the novice tone up his sea legs.

For starters, Mindscape has provided an audio cassette introduction, where a patient-sounding tutor slowly guides the user through the initial difficulties of getting his sailboat in motion. These basics are explained in a comprehensive user's manual; a sizeable booklet that uses well organized text, charts and illustrations to detail every facet of sailboat racing. Maps of the bay and its race courses are provided to help you devise some pre-game strategy, a practice course is available to give you time to hone your skills without pressure and interruptions, and there's even a motorboat docked on disk so you can climb aboard and give each layout a self-propelled test run. For the inexperienced sailor, this game is an education. You're sure to be jibbing, beating and tacking in no time.

As strange as it may sound, the only potential problem I can see with *The American Challenge* stems from all the media attention its real life counterpart has received. The barrage of print and television coverage that this grudge match attracted has served to enlighten us all on some of the finer points of Cup racing. When we look to this program to be an exact simulation of an event we've all grown to know so well, I fear that every discrepancy and omission will tend to become a bit magnified.

For example, the ship in the simulation is a single-sail vessel, leaving no room for auxiliary sails like a spinnaker or genoa jib. While it is entirely possible to take on Silicon Bay without them, these sails were much publicized, highly visible ship components during the Cup races. It's almost hard to envision the *Stars and Stripes* yacht without its colorful spinnaker billowing forward during a dramatic run. And while *The American Challenge* is undoubtedly an exacting sailing simulation, some Cup purists might be uncomfortable with the exclusion of such notable elements.

Continued on pg. 98

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REVIEWED BY SCOTT A. MAY

Championship Wrestling

Computer: Commodore 64
Publisher: Epyx
600 Galveston Drive
Redwood City, CA 94063
Medium: Disk
Price: Not available for publication

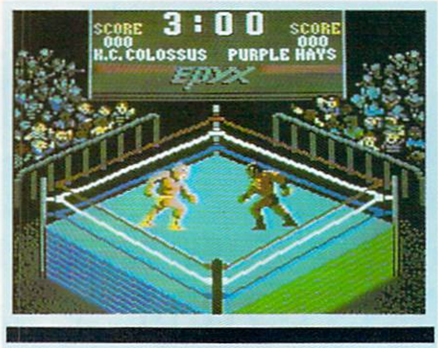
Somewhere between the realm of organized sports and the school for bad acting, we find a curious institution known as professional wrestling. It is a showcase for aggressive behavior, both in and out of the ring. Snarling giants engage in violent play-acting to the delight of a jeering crowd. The violence is all make believe, of course, purposely teetering on the brink of reality.

At first glance, *Championship Wrestling* appears to be just a lighthearted sendup of this bizarre pasttime. However, close examination reveals one of the most demanding sports games Epyx has yet produced. All the intensity and bone-crushing action of professional wrestling has been captured here in detail. Enter this arena at your own risk and prepare for some non-stop fun.

The goal in *Championship Wrestling* is to punch, kick, slam and claw your way to the coveted title crown. To get there you must defeat some of the ugliest, meanest grapplers around. Eight wrestlers are available in the game, one of whom you must represent in the ring.

In one-player games, the remaining seven will become your computer-controlled opponents. The top scores in this mode are saved to disk as certified World Records. A multi-player option allows up to eight people to select a wrestler and compete in a single elimination tournament. After the final match, tournament results are posted, ranking each player in order of endurance.

The game's underlying sense of humor is first revealed by the roster of eight super-wrestlers. Each is an overstated caricature of their real-life counterparts, stressing grotesque features and killer instincts. Where else could you find characters with names like Prince Vicious, the Berserker and Howling Manslayer? In



addition to their distinct physical presence, each wrestler boasts a unique custom move, guaranteed to bring any opponent down. The names of each custom move perfectly describes the damage they do, such as Trash Compactor, Klaw Hammer and Pop-Top.

There are 25 basic moves available to wrestlers in the game. Amazingly, each move is implemented with a simple twitch of the joystick. Just as in real wrestling, however, many of these moves are setups—one leading to another. For example, to throw your opponent out of the ring, you must first lift him above your head. And to perform a lift, you must first have him in a headlock. This chain reaction of events is not an easy task. It takes perfect timing, strategy and joystick finesse to win at this game. Player control is a major reason *Championship Wrestling* is a step beyond most crush-and-clobber contests.

The game's instruction manual is both entertaining and informative. Each wrestling move is colorfully defined, including the necessary joystick action and points scored. The moves themselves are highly descriptive and should be familiar to all pro wrestling fans: Body Slam, Pile Driver, Suplex, Atomic Drop, Airplane Spin, Turnbuckle Kick and Flying Drop Kick, to name just a few. The manual even includes a flowchart that outlines the order in which the moves should be played.

After the participants have made their selections, the main event begins with ringside introductions. While their theme songs play in the background, an animated close-up of each wrestler appears next to the scoreboard. Like ham actors, they snarl at the camera in contempt. Each has their own catchy motto, too, such as "I'll rip off your ears and feed-'em to ya!" These guys mean business.

Each wrestler enters the ring with the same strength and endurance level, represented by colored bars on the scoreboard. Every move during a match reduces their strength. Some moves, such as the Lift and Airplane Spin, take more strength than others. A common mistake made by amateur wrestlers is to attempt a difficult move at a weak moment. This will usually do little damage to your opponent and cost you the match.

Walking or standing in the ring helps regain your strength. If you are dangerously weak, walk around the ring and avoid all contact. You might even try jumping onto the turnbuckle to escape serious injury. In general, don't start something you can't finish. It is better to run away from a fight than to lose one.

On the other hand, if your opponent is on his last leg, hunt him down and go in for the kill. You can only apply your custom move when your strength is high and your opponent's is low. It is a quick (but far from painless) way to a spectacular finish.

The graphics in *Championship Wrestling* are colorful and compact. The animation of the wrestlers is particularly good. Because they can move in eight directions, the action is very realistic. Another special touch involves the crowd, which is very much an integral part of the action. During the course of a match, several rowdy spectators hold up signs reading "Kill!" or "Mangle!" And if the action slows down, a near riot breaks out. Boos and whistles remind players to pick up the pace. It's all in good fun and helps add atmosphere to the game.

Although the wrestlers sometimes appear to trudge around the ring in slow motion, there are ways to liven things up. Run full-steam into the ropes, for example, and rebound into a Flying Drop Kick. For a special treat, pick up your opponent and toss him into the crowd. It's like throwing meat to a pack of hungry wolves. Don't turn you back, however, because when he climbs back into the ring, he's likely to be in a nasty mood.

This might be one of the best multiplayer sports games available, but don't count out the computer-controlled wrestlers. The single-player option is incredibly challenging and doesn't wear thin as your skill increases. Few sports games can make this claim.

Championship Wrestling is a masterful tribute to a very unusual sport. Played alone or with a roomful of friends, this is a game you can enjoy over and over again. Highly recommended. ■

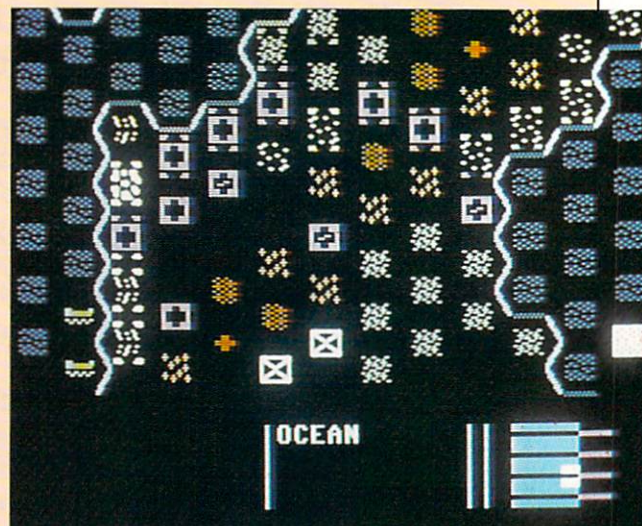
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REVIEWED BY JEFF SEIKEN

Battlefront

Computer: Commodore 64
Publisher: Strategic Studies Group/ Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
Medium: Disk
Price: $40.00

At the expense of tactical questions, Battlefront *rewards you with a broader perspective on matters of strategy.*



Battlefront is about as diverse and open-ended as computer war games come. Within the confines of its World War II setting, the game covers a gamut of actions ranging from the German airborne assault on Crete in the Mediterranean to the American amphibious attack on Saipan in the Pacific. A comprehensive scenario design system also enables players to recreate literally any corps-level battle of the war.

Battlefront features a completely menu-driven system. Although it's easy to get lost within the labyrinth of connecting menus during your first few plays of the game, the basic arrangement of the menus is not very complex. From the operations menu, succeeding menus branch out in two directions. One direction provides access to a series of informational menus which allow you to examine the map and check the status of your troops. The other direction leads you to the action menus through which you issue commands to your units.

A schematic display of the menus contained on one of the player aid cards eases the learning process considerably. The mechanics of the game system have also been streamlined to the point where implementing commands generally requires only the cursor and RETURN keys on the keyboard.

In some instances, however, the layout of the menus can prove inconvenient from an ease-of-play standpoint. For example, if you want to glance over the map when in the middle of issuing orders to units, it becomes necessary to back-track through four or five menus to reach the Examine Map menu.

On the surface, much of *Battlefront* will appear familiar to experienced computer war gamers. Units in the game are uniformly battalion-sized and maneuver across a map governed by a standard hex grid. The sequence of play is also straightforward. The two opposing players (or player and computer if in solitaire mode) issue movement and combat commands and the computer then simultaneously resolves both sets of orders.

Battlefront's departure from computer gaming tradition comes in the form of its innovative emphasis on chain-of-command. Unlike almost all other war games where the participants don a variety of command hats, *Battlefront* restricts players to one role only—the corps commander. By definition, your role as commander of a corps limits the kinds of functions you perform.

In game terms, this means that the individual battalions depicted on the screen are not under your direct control. Rather, the battalions are organized into regiments. You give movement and combat orders to the regiments. The exact manner in which the component battalions of a regiment carry out your orders is determined by the computer, which plays the part of the regimental commanders. Therefore, you can order a regiment to protect a specific town, but the computer will decide how best to deploy the battalions of that regiment in defense.

The range of commands which you can give to your regiments is limited as well. Once a regiment comes into contact with the enemy, you can essentially order it to attack, defend or retreat in the direction of its divisional headquarters. If you choose to attack, you may then select from among four options the type of attack the regiment should launch. Yet you cannot specify which enemy battalion(s) should be assaulted. This kind of determination falls under the computer/regimental commander's decision-making responsibilities.

Gamers conditioned by years of experience with computer simulations that extend player control down to the last movement factor will likely find *Battlefront*'s restricted command system frustrating the first few times around. The game sometimes leaves you feeling more like a spectator than a corps commander watching a struggle between two computer-directed armies. Appreciation of the system's merits tends to increase with repeated playings, but if the idea of abandoning even partial control of your troops to the computer sounds hateful, then by all means give this product a wide berth.

People who find *Battlefront* less than satisfying do have some grounds for complaint. Although the game might seem to take a more realistic approach to simulating a player's role within a command hierarchy, it also forces players to operate under a disadvantage their real-

life counterparts never faced—the lack of two-way communication with subordinates. By this I mean that while you can, of course, pass orders to the computer, the computer cannot explain how it plans to execute your commands. Thus, there will be times when the computer responds to your decisions in unexpected ways, possibly leading to unintended consequences.

To cite an extreme example, near the end of one scenario I was playing, the four battalions of an American regiment were defending a key town and several nearby hexes. During the orders phase, I decided to have the regiment launch a probe, thinking that an unexpected counterattack might throw the Germans off-balance. To my horror, however, after resolving the probe, the computer shifted the location of the battalion occupying the town to an adjacent hex. A German battalion then walked into the undefended town and the loss of this objective proved to be my margin of defeat in the scenario.

The potential for this sort of misunderstanding is compounded by the rulebook which describes the mechanics of movement and combat in only very generalized terms. Without a clear understanding of how either works, your ability to grasp the significance of the computer's deployment of your battalions becomes slight. Anticipating exactly how the computer will carry out your orders is also extremely difficult.

The key to enjoying *Battlefront* lies in following the advice given by the game designers in the rulebook: adopt a larger perspective. Since you cannot affect the placement of individual battalions, it's useless to fret over the matter and second-guess the computer's decisions. Rather than trying to make sense of the confused clutter of battalions spread across the screen, think in terms of regiments—you will find that the situation on the map becomes much more understandable. As a corollary to the above advice, you will save yourself a lot of anguish by always assuming that the computer is following your orders to the best of its ability. Major mishaps like the one that happened to me should simply be attributed to the fickle fortunes of war.

If you can make these mental adjustments, then the strengths of the game system will become apparent. *Battlefront* frees you from the morass of tactical details that so often bog down non-tactical-level games. Instead of devoting most of your energies to solving tactical quandries like "How can I get my two armor units adjacent to his infantry unit?" you can concentrate on the larger issues of strategy. Where should I commit my reserves? Should I suspend all attacks for 12 hours to give my troops a chance to reorganize and restock supplies? Or should I keep up the pressure on the enemy before he has the chance to bring up fresh troops? *Battlefront* makes you think in these terms and respond to situations that arise in the game in much the same way as would a real-life corps commander.

Battlefront comes with four separate scenarios, which cover about as diverse a range of actions as anyone could desire. In addition to the Crete and Saipan scenarios, players can also recreate the attempted German relief of Stalingrad and the struggle for Bastogne during the Battle of the Bulge. The computer can assume command of either side in any of the scenarios and it's also possible to play the game against another human opponent.

Victory is a result of accumulating the most victory points, which are received for capturing objectives and causing enemy casualties. Objectives, however, are often worth a considerably different number of points to each side. The values of the enemy's objectives remain a secret during play, a nice touch which keeps the outcome of a scenario in doubt through the final turn.

The four scenarios in *Battlefront* vary in length from 7 to 16 days, which translate into 27 to 63 game turns. But a pleasant offshoot of the game's division of command responsibilities between player and computer is that play proceeds at a blistering pace. Choosing which commands to issue to 10 or 12 regiments obviously requires far less time than would trying to coordinate the movements of 50 different battalions. Once you finish with the orders segment of the turn, the computer executes your commands without delay. Overall, an average turn can easily be completed in less than five minutes and the shorter scenarios in under two hours.

In addition to the four existing scenarios, the game also includes a detailed scenario design system. The design routine allows players to construct scenarios simulating any land battle from the Second World War. The only limiting factor is size, as each side in an engagement can total no more than 60 battalions. The process is an involved one: players must supply all of the necessary historical data themselves, from the layout of the map to the supply, administration and leadership values of the divisional and regimental headquarters. Battalions alone must be rated individually in 12 areas. Nonetheless, for persons with the time, motivation and historical expertise to create a scenario from scratch, the tools are there.

Despite the wealth of detail compressed into each scenario, *Battlefront* is by no means a complex game. In fact, given the limited nature of the decisions you make each turn, the game might even seem rather simple. But *Battlefront's* straightforward, uncomplicated mechanics can be misleading. It is easy to play the game in a simplistic manner, blithely ordering assaults turn after turn until your battalions exhaust themselves. Intelligent play, however, requires more thought and planning.

No regiment can withstand more than two or three consecutive days of combat and still remain effective. This means players will constantly need to shuffle units in and out of the line. Maintaining an adequate reserve, therefore, is critical. The corps commander who has no fresh troops available to relieve regiments as they become battered in combat will soon find his whole army melting away.

Yet deciding when to order a unit into reserve is no easy determination. You must weigh not only the condition of the worn regiment, but also the situation on the battlefield. An inopportune move in the face of an enemy attack can leave the withdrawing regiment in worse condition than if it had remained in place. From the standpoint of a player on the offensive in a scenario, valuable daylight turns may also be wasted before the new regiment is able to get into position and continue the attack.

In a rather subtle way, *Battlefront's* limited range of command options clarifies the decision-making dilemmas faced by players during the course of a game. At the expense of tactical questions, *Battlefront* rewards you with a broader perspective on matters of strategy. The game sharply restricts the degree of control you exercise over your troops, but the overall direction of the battle and, most importantly, the potential for victory or defeat remain firmly in your hands.

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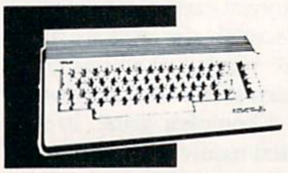
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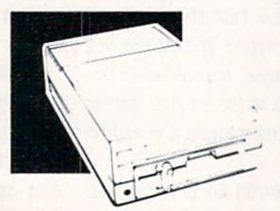


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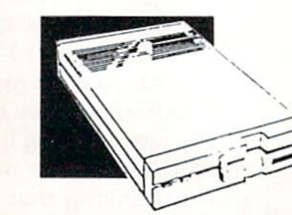
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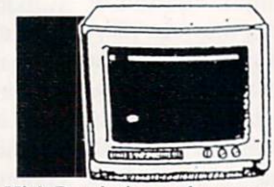


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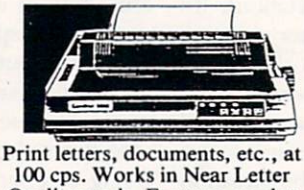


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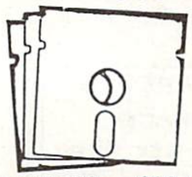


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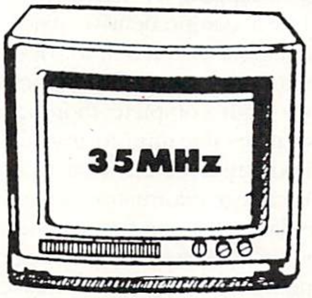
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REVIEWED BY MARK COTONE

The Perfect College

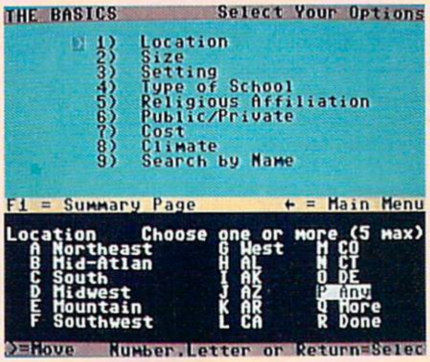
Computer: Commodore 64
Publisher: Mindscape
3444 Dundee Road
Northbrook, IL 60062
Medium: Disk
Price: $19.95

With a little over 1,650 accredited four-year colleges across the United States, a student can be faced with quite a task when trying to research and select a school to meet his or her needs and expectations. Traditionally, the perplexed student has been able to turn to parents, peers, counselors and college catalogs for sources of assistance. Well, with all due respect, Mindscape would now like to offer an addendum in the form of *The Perfect College,* and given the chance, this informative program just might prove to be a college-bound student's most effective and accurate decision-making tool.

In a nutshell, *The Perfect College* is a data base containing about 440,000 facts on United States colleges and universities. To access this information, the student runs through an exhaustive list of topically-grouped criteria, selecting all the elements he or she believes should be ingredients in higher education. When a profile is compiled, the program then conducts a search and produces a list of schools that satisfy the criteria.

The college-selection criteria is presented in five categories. First is the Basics, where the user can note a preference as to his prospective school's location, size, climate and cost. Next is Competitiveness, where the student considers just how much weight should be placed on SAT, ACT and/or GPA scores, and whether or not he or she wishes to approach colleges with stringent admissions standards.

Under the Academic heading, majors, special programs and student/faculty ratios are examined. In the Student Life category, choices can be made regarding activities, sports, housing and the male/female student ratios. And finally, under the Admissions heading, aspects of application requirements, deadlines and options are covered. Across the five categories, 26 different areas are extensively reviewed. Of course, this does not mean that 26 definitive decisions must be made. It is only necessary for the user to specify the criteria that he or she believes is important—you can can simply choose not to choose.



The Perfect College *is a data base containing about 440,000 facts on United States colleges and universities.*

For example, when dealing with your preferred college locations, you can either select a specific state, a particular geographic region (such as Northwest), or, if your roots are adaptable to all soils, you can opt not to decide at all by choosing the Any option. During the search process, the program merely skips over any category devoid of specifications.

After the search function is complete, the user is provided with two lists. The A list displays the names of the schools that fit every one of the selected options exactly, and the B list provides the names of the colleges that met all but one or two of the student's requests. The number of schools in each tally will be based on how narrow or broad a scope was set with one's choices. Any or all of these listed schools can then be researched even further with the help of the built-in description function, which provides a full five-page rundown of all the schools' particulars, including everything from probable temperature to current tuition. And at this point, if a certain school looks especially appealing, you then have the option of printing out all of its summary pages, along with any of the other lists and charts that you deem important. It shouldn't take you long to get together a workable file of six to ten promising college prospects, from which a more detailed investigation can continue.

When using *The Perfect College,* the accent is on simplicity. All of the options are menu-driven, making movement around the data base as easy as hitting a key or tapping a joystick. The user manual is a comprehensive piece of documentation that not only describes and outlines the various categories and functions with complete thoroughness, but also takes the time to instruct the high school students on what to do with all this college information once they get it. Holding a list of a few schools' names in your hand is only the very beginning of a long admissions process that can be an absolute nightmare for the innocent.

Aside from its intended use in helping the serious student to find a school to match needs, I have found *The Perfect College* program to have a couple of other uses that may not be as obvious. For the undecided student—the pupil who is interested in expanding his or her education but really doesn't know what field to pursue—this data base may serve as a way of gaining some sort of personal focus. The questions this program poses when presenting its lists of criteria force the user to make choices concerning interests and preferences. If the exercise is taken to heart, it can help the student to establish an academic foundation, no matter how broad, that may later serve as a springboard into a more specialized field.

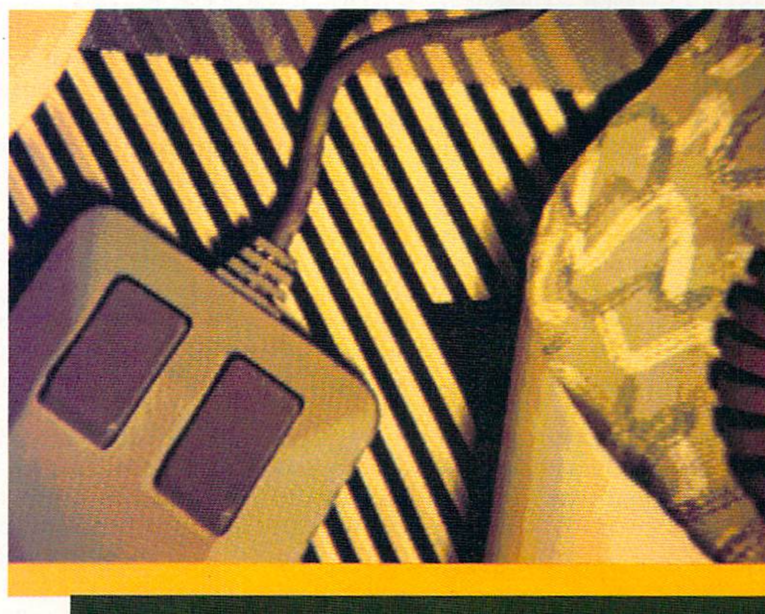
Also, for those students who are hesitant about going to college because they don't think it can offer anything of interest or importance, a quick tour through the Academics and Student Life categories should serve as a real eye-opener. The sheer number of majors and activities listed are enough to make you think twice about your future, and might even go so far as to spark some excitement.

Comprehensive, extensive and accurate (it's updated annually), *The Perfect College* is the ideal guidance tool for all students who take their education seriously. It could never replace the counselors and catalogs as a source of information and assistance, but it's a perfect supplemental tool—one guaranteed to get you pointed in the right direction. C

THE
AMIGA
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THE AMIGA TECHNICAL REFERENCE SERIES from Addison-Wesley gives software developers and programmers the key to unlocking the power and versatility of the Amiga Personal Computer.



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REVIEWED BY SCOTT A. MAY

Thinking Cap

Computer: Commodore 64
Publisher: Broderbund
17 Paul Drive
San Rafael, CA 94903
Medium: Disk
Price: $49.95

An essential part of writing is capturing ideas as they pop into your head, because brilliance is often a fleeting notion. What you need is *Thinking Cap,* the outline processor from Broderbund that helps organize your thoughts to make writing easier and more productive.

Working from an outline is a fundamental concept of English composition that makes perfect sense, yet most people rarely take the time. As a result, many writers fail to develop their ideas to the fullest. A few sessions with *Thinking Cap* and you'll wonder how you ever got along without it.

Thinking Cap isn't the first writing tool of its kind on the market, but it is easily one of the most professional. One of this program's greatest strengths is the flexibility afforded to the user: freedom to move along at your own pace, make changes and jump around at will. The key to success lies in your ability to brainstorm ideas as quickly as possible, leaving organizational duties to the computer. *Thinking Cap* provides the foundation on which great ideas can be stacked like building blocks, one idea leading to another.

The program allows a writer to enter up to 16 major topics (headlines) to form the basic structure of an outline. Consequently, up to seven levels of subtopics can be added to each headline. At each level, subtopics may also contain as many as 16 individual entries. An entire outline has the potential for considerable depth.

Thinking Cap employs two modes of operation when working with your text: Brainstorm and Overview. Brainstorming is the heart of the program. Here the writer is encouraged to simply pump out as many ideas as possible. Because spontaneity is crucial in this stage of your outline, the keyboard commands necessary to move quickly from one section to another are simple and easy to use. The important thing is to preserve your ideas while they are fresh. *Thinking Cap*'s organizational powers give you the freedom to concentrate on the most difficult aspect of writing—creativity.

The Overview mode allows you to view an outline as a whole or in individual sections. A depth indicator at the top of the screen keeps track of which level of information is currently displayed. In Overview mode, users can increase or decrease the level of detail by pressing the + or - keys. Pressing the = key at any level will filter out all text, displaying only topic headlines. The * key reveals or hides topic numbers on the screen.

The Overview mode is also important when printing your outline. *Thinking Cap* will only print what is displayed on the screen. You must make certain the desired level of text is displayed on-screen or it will not be included in the final printout. The depth level is not selective, however. To display or print level five, for example, the program automatically includes the preceding levels.

The designers have done a remarkable job of making this program as easy to use as possible. The most appealing aspect is the inventive use of multiple window graphics for viewing and editing text. Simply move the cursor-controlled highlight through the outline (in Brainstorm mode) and press RETURN. The contents are immediately revealed in a slick pull-down window display.

Pressing the English pound sign produces a similar text window, this time in Edit mode. Here you can insert or overwrite text using standard word processing features, including selective or global search and replace, cut, paste, move and copy. It is interesting to note that unlike most word processors, the search-and-replace feature will scan the document in both directions. Editing commands can be used in either Brainstorming or Overview mode, working with single entries or an entire outline. A true workhorse, *Thinking Cap* will automatically reformat your outline no matter how much you cut and paste ideas.

The instruction manual explains every aspect of the program thoroughly. A reference card is also included, but is not really needed. A pop-up help window, which lists every available command, can be accessed by the Commodore key.

As an added convenience, *Thinking Cap* contains two separate text buffers which coexist in memory. The first is called the Section Safe, where you can store a topic, subtopic or entire section of your outline. Another buffer, used within the Edit window, is the Text Safe. This can be used to store blocks of text from a specific topic or subtopic.

Depending on the type of printer used, *Thinking Cap* also allows users to place embedded printer commands directly into the text. Standard commands include boldface and underlining. User-defined coding is provided for printers with special features, such as italics and letter quality type.

Pressing the CONTROL key at any time (except when editing) reveals yet another pull-down window: the Command Menu. Here you can perform various DOS functions and load/save your outline as a whole or in sections. Separate outlines may also be merged on-screen and viewed together or individually. Although the program keeps track of the text space currently available, the manual makes no mention of the total memory capacity. In general, though, *Thinking Cap* has more than enough room for several extensive outlines.

Print enhancements and page layouts can also be manipulated through the Command Menu. Enhancements include page titling (full or short headers), level numbering (Roman, numeric, technical or prose), indentation, breaks and headline emphasis. Page layouts allow users to modify settings such as line spacing, margins, page numbering and paper length. The aesthetics of the final printout should reflect your specific needs. As a rough draft for further development, you may prefer to leave it open-ended. For school and business use, however, *Thinking Cap* will effortlessly provide you with a professional-quality outline.

Additional features include a backup system which automatically makes a backup file when saving an outline to disk. Users may also choose from several color schemes for the text and background display. Options such as these can be saved to the master disk and used as the default setting each time the program is loaded.

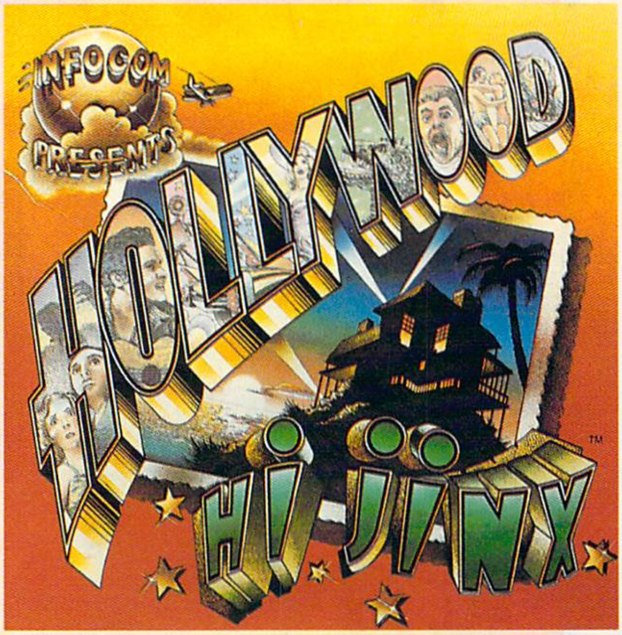
Thinking Cap cannot interface with a word processor, because it wasn't designed to replace your trusty old friend. But it still goes beyond practical. For anyone who has ever suffered from a severe case of writer's block, *Thinking Cap* comes on like a breath of fresh air. ■

REVIEWED BY RUSS CECCOLA

Hollywood Hijinx

Computer: Commodore 64
Publisher: Infocom
125 Cambridge Park Drive
Cambridge, MA 02140
Medium: Disk
Price: Not available

The attorney hands you Aunt Hildegarde's will, a picture of Uncle Buddy with a handwritten poem on the back, and a flashlight. Now you must earn your inheritance.



In *Hollywood Hijinx*, your Uncle Buddy was the king of exploitative, cheap, second-grade films, otherwise known as B-movies. He died of a heart attack while screening his last work, "A Corpse Line." That was many years ago. Now your Aunt Hildegarde has died unexpectedly, rocking the gossip columns as to who will inherit the Burbank estate. After a quickly arranged funeral, an attorney explains the situation.

It seems as if Aunt Hildegarde and Uncle Buddy have decided to turn over their estate on beautiful Malibu beach to you. The attorney hands you Aunt Hildegarde's will, a picture of Uncle Buddy with a handwritten poem on the back, and a flashlight. All this attests to the fact that you were the favorite of their nieces and nephews who spent summers at Hildebud (the estate) and that you must earn your inheritance. The way you accomplish this is by finding ten treasures from Buddy Burbank's movies in exactly 12 hours. The lawyer informs you that you must find the treasures and meet him in the livingroom with them by 9 AM the next morning.

The game at first seems pretty easy, with all of these treasures just lying there waiting to be found. But don't be misled. *Hollywood Hijinx* is in the Infocom mystery category and should be treated with care. You will not find the ten treasures by simply tearing apart the house. As Aunt Hildegarde's will states: "So, although we both think you are clever enough to manage everything wisely, we need to make sure." So don't feel discouraged if you can't find a treasure immediately—it takes time. You probably won't claim any treasures until about midnight the first time you play.

Hollywood Hijinx truly tests your perception and attention to detail. Only with these qualities would you manage to notice the sickly rose bush that you got sick on after smoking one of Uncle Buddy's smelly cigars. Along those same lines, don't think that the treasures will fall into your hands. Just type in this command when you enter the foyer and see what happens: Up. Now you know what you're up against.

The best thing about Infocom and interactive fiction is that you can type anything you want as a command and, for the most part, the game will respond to your action. Text adventures thrive on the commands you type. It's just you and your keyboard against the computer and the world on your floppy disk. So use it to your advantage. The game only unfolds when you type commands. Infocom's language parser is one of the best on the market. With commands such as again (repeats action) and verbose (gives a full description of the location you have just entered), Infocom games turn into a customized environment, enabling the player to journey through the game in the way that feels comfortable.

One unique element of the game is the ability to obtain a printout of your entire game session. This is accomplished via the SCRIPT and UNSCRIPT commands. With this printout in hand, you can avoid wasting valuable game time and examine locations again by just paging through the script to your game session. This feature is especially helpful in *Hollywood Hijinx* in that a map is printed onto the screen to help you through the Hedge Maze.

It's these little touches that make Infocom and *Hollywood Hijinx* a good investment for the software dollar. I played it for ten hours before even getting close to the finish. That doesn't include the three hours spent on mapping out the Hedge Maze myself. This Maze bit is the only complaint I have about the game. The maze that I traced was on graph paper. The maze that Infocom produced was made in a haphazard fashion. The direction descriptions in the game say things like 10 feet west and 70 feet north. So, I took each block on the graph paper as 10 feet and drew the maze from there.

Still, I stand by *Hollywood Hijinx*. It is an excellent adventure and contains many references to Hollywood stars and movie moguls, such as Johnny Carson, Morgan Fairchild and Roger Corman. Hildebud is a wacky shack of tricks and hidden passages, not unlike a fun house. You have your work cut out for you. The scenery and descriptions of the house and grounds are full of explicit detail that cannot go unnoticed. Many of the locations around the mansion show evidence of you and your cousin's exploits at the house when you were young. This is suspicious, because you sometimes hear footsteps and things thudding on floors; you assume that you are the only person in the house. Could it be Cousin Herman? He never liked you anyway, and

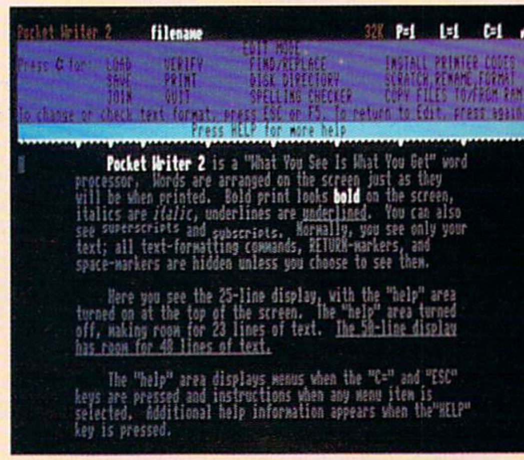
Continued on pg. 115

REVIEWED BY DONALD MAXWELL

Pocket Writer 2

Computer: Commodore 128
Publisher: Digital Solutions
30 Wertheim Court Unit 2
Richmond Hill, Ontario
L4B 1B9 Canada
Medium: Disk
Price: $59.95

With Pocket Writer 2, *you can see almost an entire printed page of text, formatted just as it will be on paper.*



If I could have only one word processor for my Commodore 128, it would be *Pocket Writer 2*. That's a rather broad claim, considering how many good word processors are available, so you might want to know that I have thoroughly tested more than 60 word processors—some 40 in print.

So I'm confident that for most writing purposes, *Pocket Writer 2* is one of the very best word processors available for any computer. It's transparent—easy to use and unobtrusive. It has all of the features expected in the most powerful word processors. And it has several special features that no other Commodore 128 word processor has.

Here are some of the features that set it off from the rest.

Choice of 25-line or 50-line Display. You can see up to 48 lines of text at one time—nearly an entire printed page of text. All functions work in both displays, and you can switch from one to the other in less than a second, without disturbing your text. The 50-line display is legible, even on a color monitor.

What You See Is What You Get. What you see on the screen looks as it will when printed out on paper. You get automatic on-screen formatting of text, even while inserting, plus actual underlines, italics, boldface and superscripts. All formatting commands, returns and space-markers are hidden unless you wish to see them.

Menu-driven. There are two clear, quick single-level menus, one for text formatting and the other for disk functions, printing, find-and-replace and spell-checking. There are no sub-menus to confuse you or waste time and no embedded commands to remember.

Resident Help Information for Every Function. Instructions are automatically displayed for each function menu selection. And pressing the HELP key calls up information about the other operations.

Two Files in Memory at the Same Time. You can have one file as large as 64K or two simultaneous 32K files, with one-key switching between the files and easy copying of text from one file to the other.

Move Columns Horizontally or Vertically. This enables you to rearrange tables and columns of figures quickly and easily, without any retyping.

Those features alone would make *Pocket Writer 2* a powerful writing tool. But there are more. Of course, it has everything any good word processor should have, such as fast cursor movement; copy, move, delete and recall blocks of text; headers and footers; mail-merge; redefined characters; multiple line-spacing; and too many others to list here. And it also has many less common features, such as these.

Go to Page Number: Fast cursor movement to the top of any page.
Negative Indentation: Outdenting for outlines, numbered lists, etc.
Word Count and Remaining Memory Capacity: Instant counts available at any time.
Alphabetize Lists: Forward and reverse sorting.
Add Columns and Rows of Numbers: Vertical or horizontal adding and subtracting.
Side Scrolling to 10,000 Columns: The display moves in fast 40-column steps.
Mouse or Joystick Option: Special pull-down menus appear when you use the mouse or joystick.
French Characters: Entered directly from the keyboard.
Integral Spell-checker: No need to save the text before checking. Relatively fast (87 seconds to check this review). 32,000 word dictionary, expandable to 40,000 words (must be purchased separately for $14.95) or make your own.
Automatic Word-wrap, Even in Insert Mode: Manual reformatting is never necessary.
Uses the 1571 Burst Speed: It can also use the 1541.
Reads and Writes All Types of Files: PRG, SEQ, standard, ASCII, Commodore ASCII.
Scratches Files from the Directory.
Loads GEOS Text Scrap Files.
Works with RAM expanders.
Configuration File: Automatically sets your preference of margins, colors, etc., when the word processor loads.
40/80-column Commodore 64 Word Processor: This is on the back of the disk. It includes most features of the 128 *Pocket Writer 2,* except that there is an 80-column option instead of the 50-line display.

Drawbacks

Impressive as *Pocket Writer 2* is, however, it does have a few drawbacks. For example, there is about a half-second de-

lay while the text is being re-formatted after the RETURN key is pressed. And the find-and-replace function is really slow. In the regular 25-line mode, it takes nearly one second for each iteration, which would be frustrating if you had to do lots of repetitive finding. It takes twice as long in the 50-line mode. Oddly, however, I almost never seem to notice this sluggishness while composing or copy-typing.

There are also some things that *Pocket Writer 2* won't do at all. Here are the most significant.

* It won't print pictures or fancy fonts, like those produced by *GEOS, The Print Shop* or *Fontmaster.*
* It won't do soft hyphenation.
* It won't multiply and divide.
* It won't do multi-level sorts.
* It won't do automatic footnoting.
* It won't do book pagination or print multiple columns of text at one pass of the printer.
* It does not include a built-in terminal program, as does *PaperClip II* or a database manager like *Fleet System 3.* However, *Pocket Writer 2* articulates with Digital Solutions' spreadsheet, *Pocket Planner,* and their database manager, *Pocket Filer.* And it can print graphs produced on *Pocket Planner.* Also, it can load files from just about every other Commodore 64 and 128 word processor. Its files are completely interchangeable with *PaperClip* files.

The 50-Line Display

Pocket Writer 2 would be an excellent word processor even if it had only the 25-line display. But the 50-line display is so unusual and useful that it needs special discussion.

The 50-line display is produced entirely by the *Pocket Writer 2* program; no additional hardware is needed. Each line is half as high as in the standard 25-line display, but the width is the same, 80 columns. You can see up to 48 lines of text on the screen at one time (or 42 lines with the help area turned on), plus a command line and a tab scale. In other words, you can see almost an entire printed page of text, formatted just as it will be on paper. Or by setting the margins to 1 and 80, you can get nearly 600 words on the screen. The 50-line display also works when you call up a disk directory, so you can see up to 48 filenames at a time.

The character set is clean enough to be read on an RGB color monitor, although a few characters may be hard to tell apart on some color monitors—8 and 9, for example. On a monochrome monitor, however, the image is *perfectly* clear.

The 50-line display may flicker slightly on some monitors. This was disappointing at first, but a little experimenting with the text and background colors and the contrast and brightness controls turned up a combination that eliminated the flickering entirely, although with the screen slightly darker than I'd really like. Changing the 50-line colors, by the way, does not affect the 25-line colors. And the colors for both displays may be set by the configuration file when the word processor is loaded.

All features work in both displays, although a few take about twice as long as in the 50-line mode. Pressing RETURN at the end of the text with the insert mode on, for example, takes about two seconds before the text is reformatted and the cursor reappears. So if I'm in a big hurry, especially while inserting text into a paragraph, I switch temporarily to the 25-line display.

Documentation

The 72-page manual contains all the information needed to use *Pocket Writer 2.* It is generally clear and succinct. However, because it applies to both the 128 word processor and to the 40-column/80-column 64 word processor which is on the same disk, a few places seem cluttered by varient instructions. There is a brief tutorial section, but most of the manual is a reference guide, with a thorough index and a quick reference chart.

Pocket Writer 2 supports all printers. The disk contains driver files for 38 printers, and there is a blank file that can be filled in to drive any other printer.

The program is copy-protected. A backup copy costs $10.00. Upgrading from version 1 of *Pocket Writer* costs $19.95.

Evaluation

This is going to sound more like a testamonial than an objective evaluation, but I can't help it. I like *Pocket Writer 2* so well that —despite somewhat sluggish re-formatting and slow find-and-replace— I would no longer consider writing on any other word processor currently available for either the 128 or the 64. (I do, however, use several of them for fancy printing jobs that *Pocket Writer 2* can't handle.)

It would probably be my first choice even without the 50-line display. But I use the 50-line mode almost exclusively now, and feel deprived and slightly shocked when I have to look at a conventional 25-line screen. ◼

Using *Pocket Writer 2* Creatively

For Special Printer Codes That You Can Embed in Your Text

Change the codes for the French character keys (CTRL-0 through CTRL-9) in the printer file so you can print special characters and change printer fonts merely by typing in a CTRL-character. This enables you to change the printer pitch, for example, right in the middle of a word. The CTRL-character itself won't show in the print-out, but it will count as one of the characters on the line.

So that the CTRL-characters displayed on the screen will match their new functions, load the "french chars" file, change the positions of the asterisks that turn on pixels, and save the file again. The "french chars" file loads automatically along with the word processor program.

Print Multiple Columns of Text in One Pass of the Printer

Enter your entire text normally. Be sure to proofread now, because the next step makes further editing difficult.

Set the right margin to the desired width for one column of text. Then end all lines with RETURN by changing the file type to SEQ (with CTRL-a), and then change back to a PRG file again with CTRL-4.

Reset the right margin to where the right-hand edge of the multi-column text will be on the paper. This can be any number of characters up to the maximum your printer can handle for the font you want it to print.

Move the cursor to the top of current page two. Define a one-page block of text (not a range) with CTRL-b. This will become the right-hand column. Move the block up a page and to the right to align it with the left column. Delete the return markers where the moved column used to be.

Repeat the previous step for each page you want in multiple colors. ◼

REVIWED BY TIM JONES

UCSD Pascal

Computer: Amiga
Publisher: Pecan Software Systems
1410 39th Street
Brooklyn, NY 11218
Medium: Disk
Price: $99.95

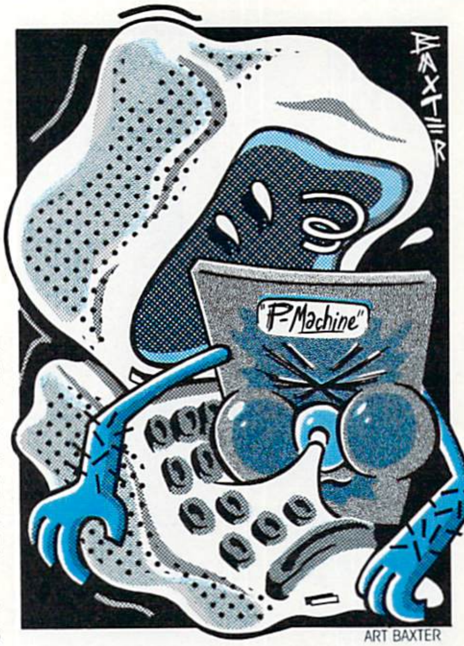
One of the major concerns overheard at a recent Amiga user's group meetings is one concerning inter-system compatibility and emulation: MS-DOS compatibility via the Transformer and Sidecar; rumors of Commodore 64, Apple II and Macintosh emulators; and programs that allow the Amiga to emulate VT100 and Tektronix 4010 terminals.

One machine emulator that has become available on the Amiga, however, is a little less well known—it is the p-machine made popular by the University of California at San Diego's computer department (UCSD).

Most programmers who know of the p-machine are most familiar with it under the guise of a Pascal programming environment. This, however, is only one of its capabilities. The p-machine is based on an operating system, like UNIX, MS-DOS or any number of others, called the p-system. [Editor's Note: Pecan Software Systems refers to this as the power system.] The p-system is an environment that is very complete and, thanks to the folks at Pecan Software Systems, is now available for the Amiga.

The p-system is available in different system modules that include ISO standard Pascal, BASIC, Assembler, FORTRAN-77 and Modula-2. The units that I tested for this review were the Pascal compiler and the assembler. Both units come with documentation that is designed around an MS-DOS environment, but also include, in the case of the Pascal system, Amiga-specific information in the form of an addendum manual. The manuals are easy to read and will make sense to anyone who has any background in various operating systems, including AmigaDOS (assuming that you haven't locked yourself into WorkBench).

The p-system is a menu-based development environment in which the menu is displayed at all times as the uppermost line in your display. To invoke a function, you press the associated key and the development environment performs the appropriate function. Commands are set into logical groupings and fall under one of three menus. The menus are easy to follow and help for any function is readily available on-line simply by pressing the plus sign key.



ART BAXTER

As you move between system resources, the menus change to indicate which application you are currently working under and the help function automatically changes to give help that is pertinent to the functions that you are currently using.

If you are familiar with the p-system, you will find that the menus that have been supplied with the Amiga p-system are the same as those found on other p-system implementations. Therefore, moving from another computer to the Amiga is very simple. Also, the file formats are the same and the standard file transfer utility, REMTalk, has been included in both source and executive formats to communicate and transfer files between the Amiga's other p-systems.

If you are unfamiliar with the system and find the Pecan p-system descriptions too advanced, Sybex Books has a very good tutorial entitled *Introduction to the UCSD P-system* by Charles Grand and Jon Butah. This book is the standard guide for newcomers to the world of the p-machine. With the exception of a few outdated feature descriptions, the book is easy to follow and all examples work under the Amiga environment.

The four major system applications consist of the Main menu, from which all other operations are invoked; the Filer, for handling disk file maintenance; the Editor, one of the strong points of the system; and the Compiler.

The Filer allows you to do full p-system file maintenance, and if you have set your file type to AmigaDOS instead of p-system, you can manipulate AmigaDOS files. Under the Filer you may move, copy, delete, create and change files. You may call up either short format or extended format directories, giving you a quick listing of available files, or a complete description of those same files, including creation date, size, location by block number within the volume, and file type. Wild cards are supported for all Filer functions and all input for the user/programmer is fully prompted.

The Advanced System Editor is a very complete editor that operates under the same menu structure as the Filer and Main system. It has features that allow macro definition for easier repetitive keystroke entry, search and replace, block copy, delete and move, and other features that can make the difference between a good editor and a great editor. All editing sessions are saved in a simple text format that may be transferred via a special Amiga p-system program to an AmigaDOS file. If you are editing a previously created file, the old file will be renamed to filename.BACK with the new file being saved as the current version so you can always go back and rescue things if you get too carried away.

As for the Compiler, compile times on the system vary depending on the number of lines in your source file. However, most fall into the 300+ lines per minute range. The worst compile time that I ran into was a seven-line example from the Sybex book mentioned above, which turned in a 35-line per minute compile time. Obviously, the Compiler is very fast.

One thing that should be considered before you start wondering where the performance comparisons are is the fact that the source-to-run-file process involves a single step as the compiler does the entire job. Unlike a normal system that requires you to link your object modules (produced by your compiler) to a set of system function libraries, the p-system accepts the results of the compile process without any further processing. This in itself will give you a terrific speed increase over a normal system.

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REVIEWED BY GARY V. FIELDS

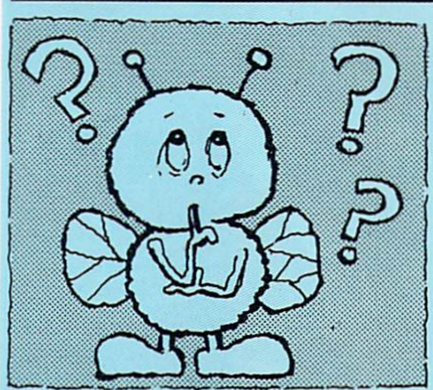
Buzzword

Computer: Commodore 64
Publisher: The Buzzword Game Company
5582 South Veno Court
Aurora, CO 80015
Medium: Disk
Price: $39.95

When people begin telling me about word games I usually yawn. I find most of them either boring, repetitious, short on fun, or some combination of those three. At last there is a word game that falls into none of these categories.

Buzzword has the better qualities of existing games, but isn't a duplication of any. It incorporates the better features of TV game shows like *Family Feud, Wheel of Fortune* and *Jeopardy,* but retains some of the flavor of the old Spelling Bee game. What makes *Buzzword* so appealing is the mixture of challenge and strategy it employs. You don't have to be a walking dictionary to win (but it helps) and you can enjoy the game without competing (but who doesn't enjoy outscoring the other fellow, especially when you know he's doing his best). The game includes multiple levels of challenge so even playing the same categories over and over doesn't assure you'll win, since the words used are randomly selected and the chance of playing the game the same way twice are astronomical. Because of this, sound strategy is nearly as important to winning as being wordwise. Knowing when to pass, how to play the bonus rounds, and things like which categories will trip your opponent are all important.

When you first pick up the *Buzzword* package, you'll know something is different—it's heavy. That's because along with the manual and program disk you also get 200 3-inch by 4-inch category cards. The cover of each card displays a facsimile of the game screen you can expect to see when that category is played. The cards are not required to play *Buzzword,* but are used when you want to choose specific categories, play a challenge round against a friend, or want to cheat (the back of the cards also give the answers). Each card is numbered, so you can select categories which interest you.



BOB CLARK

Buzzword *incorporates the better features of TV game shows like* Family Feud, Wheel of Fortune *and* Jeopardy, *but retains some of the flavor of the old Spelling Bee game.*

But if you really want a challenge, you can simply input random numbers and let fate pick the categories.

To play, you first select the competition level (there are 32). The easiest level gives lots of hints, has no time limit, and is played solitaire. The levels get tougher until level 16 which includes no hints and is timed. Levels 17 through 32 are exactly like levels 1 through 16, but you compete with another person. Each of these 32 options can be played at three levels of difficulty, which range from challenging to difficult to nearly impossible. Unlike some games, you (not the program) determine when you are ready to move on to expert status.

The 32 option levels cannot be changed until a game is completed, but the difficulty levels can be changed each time a category is selected. For instance, if you or your opponent selected sports as the category and you know a lot about sports, you could compete at the most difficult level and hope to rack up big. On the other hand, if the selected category is something you feel uncomfortable with, you could compete at a lower level where your scoring or losses would be a minimum. Level selection may sound a little complicated, but during actual play, the selection sequence is easy and natural. The nice thing about so many levels of play and number of categories is that strategy becomes a key element to win. The number of levels also guarantee that *Buzzword* will always be a challenge.

You are now ready to select a category. This is done by choosing a category from the game cards (or the quick reference page in the user's manual) and inputting its number. If you want to be surprised, you can simply type in the first number which pops into your head. The range of categories is huge and covers music, warplanes, candy bars, sign language, holy places, the zoo, cowboy life, the male animal, and nearly anything else you could imagine.

With those three decisions made (option, level and category), you are ready to play. The screen displays six windows. Two windows show information about the players, whose turn it is, the player's ID number, how many rounds each has won, their total score, and how much the current pot is worth. The third window displays the category title, its value and the card number.

The largest window displays nine blocks with letters and numbers. These letters are the first characters of the words you are supposed to guess. The number attached to them tells you how many letters are in the word. For instance, if the category was Sports World, one of the letters displayed might be D with a small nine attached to it. In essence, the game is asking you "what nine-letter word starting with D is associated with the world of sports?". (The correct answer would be decathlon.)

When the play begins, each player takes his turn guessing a word which fits the category. This is where the hint windows play an important role. At the easiest levels, you can check to see if the first letter of the word you are about to try is still active. If not, you know to think of something else. Also, if your word is six letters long but the only word remaining which starts with the letter you are about to play contains fewer or more characters, then you know to try something else. At the advanced levels of play, these hints are absent and the chance of inputting the wrong answer increases. It's also important to keep track of words that

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BY SHAY ADDAMS

The Pawn: England's Finest Hour

News and opinion from a leading explorer of those fantasy realms called adventure games.

When someone told me the parser in this British adventure for the Commodore 64, 128 and Amiga was almost as smart as the Infocom parser, I did not believe it. Though the scenarios of English adventures are often more imaginative than their American counterparts, the programming has always been technically inferior, especially in the parser department. So I was amazed when I played *The Pawn,* written by Magnetic Scrolls and distributed here by Firebird.

The program handily parses circles around every American counterpart except Infocom's—and it's not far behind that one. How many programs could handle this sentence: "Get all except the cases but not the violin case then kill the man-eating shrew with the contents of the violin case."? With a 3,500-word vocabulary, it understands adjectives, pronouns and *two* interpretations of the conjunction and instead of just one as with most parsers. That means you can say "Remove the shrew's tail and use it to tie the pole and the noose together."

The parser outdoes Infocom's in the number of multiple commands it can deal with in one whack: 32. Actually, the only significant capability the Infocom parser has that is missing here is the "oops" feature (if you've misspelled or used an unknown word in a command, such as "get the yellow frob," you can say "oops frog" instead of retyping the entire command).

But even the world's smartest parser is just a bunch of bits and bytes unless it's put to work inside a good game, and *The Pawn* also delivers well-honed prose, vivid graphics, innovative visual effects, and dozens of puzzles—some diabolically difficult, others deceptively simple—in an imaginative story.

After being knocked out on the way



home from the market, you awake in the magical land of Kerovnia. On your wrist is a silver band that cannot be removed. Your goal is to escape Kerovnia, where a general election is about to be held to decide whether King Erik will continue to reign. A dwarf, whose campaign pledge is to "rid dungeons of mazes of any sort" is running against the King. Other locals you'll meet are Kronos the Magician, a Guru on a hill, a Dragon and an Adventurer.

The game's title starts to make sense after you've talked to some of these folks—everyone has a task for you and you're never quite sure what goals they're really using you to attain. Kronos, for example, wanted me to deliver a note to King Erik. But the King pitched a fit when he read it, then the guards threw me out of the castle. Most puzzles are object-oriented, and there are scores of things to juggle while figuring out where to use them and how to do so.

If you get stuck, the program's on-line hint feature doles out graduated hints. You just type in encrypted clues from the book to see clues about specific problems. But some clues can't be obtained until your score is high enough. And typos rendered several of the clues completely useless. (Firebird also gives hints over the phone.) Top score is 350 points, and only the sharpest adventurers will get them all without a clue or hint from somewhere.

About 50 of the locations are lushly illustrated, with three text lines visible below. Like most graphic games, *The Pawn* lets you turn off the pictures. It also introduces new options. For example, if you need to read text currently covered by a picture, you can hit a function key to scroll the picture up or down a line at a time (which is faster than turning the entire picture off and then on again). The 64 version has cameos which zoom the picture down to fill a small rectangle in the upper right-hand corner so you can read the entire screen and still see a picture. Text passages often extend across screens and the prose is distinguished by a wry sense of humor.

With all but the 64 version, the entire two-disk program loads into RAM and accesses the disk only to load fresh graphics. Even the 64 version doesn't go to the disk often. The 128 version runs in native 128 mode, has better graphics, and a choice of 40- or 80-column display. Amiga owners will get the best pictures, of course.

The program is not copy-protected. Intermittently it requests you to type in a word from a certain page and line of an accompanying 55-page book, the same scheme employed by Broderbund's Electronic Novels. This means you can make backup copies of the program disks. Technically and creatively, this is England's all-time best adventure game. For advanced players, *The Pawn* is a must whether you prefer text or graphic adventures. And by the time you finish it, Magnetic Scrolls should have completed their next title, *Guild of Thieves.*

Infocom's Moonmist

A Gothic ghost story, Infocom's most recent mystery is a good novice/intermediate level game that stands out as the most replayable adventure ever. You are cast as an American private eye whom an old friend has asked to solve the mystery of a ghost apparently haunting an English castle. After arriving, you discover two more goals: find a treasure and uncover evidence of a murder. The goals are independent. You don't have to find the treasure to identify the ghost, for instance. The puzzles are a mixture of object- and people-oriented problems. Talking to the butler, Lord Jack, Dr. Wendish, Vivien Pentreath and other guests is mandatory for turning up certain evidence and clues. There is no Duffy or lab to which you may send evidence to be analyzed, so you're solely dependent on your own wits in puzzling out this mystery.

As in *Deadline,* a 24-hour time limit is imposed, but even if you've accomplished only one of the goals, by then you'll feel somewhat successful. You don't get points or a score. Type score or quit and you learn about your progress: "So far you've found the treasure, but haven't identified the ghost or found the evidence." When you've attained all three goals, you get to read the author's explanation of the plot and learn exactly what happened, who did it and why.

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Tips & Tricks

Hints For Fun and Utility

COMPILED BY LOUIS F. SANDER

In deference to July's warm weather, this month's offerings are light, bright and easy to digest. That's not to say they're unimportant—as usual, every one is a dazzler. If you have a dazzler of your own, send it to:

Louis F. Sander
P.O. Box 101011
Pittsburgh, PA 15237

We pay from $10 to $50 for each item we use. If you enclose a self-addressed envelope, we'll send you a Hint Writer's Guide. Readers outside the U.S.A. may omit the stamp.

Directory Viewer: This short routine works with any Commodore computer and will display the disk directory on your screen without loading it into the computer's memory. If you use this in a program as a subroutine, you'll have instant access to the directory at any time while your program is running, and you can exit just as easily be pressing Q to quit.
Joseph R. Charnetski
Dallas, Pennsylvania

```
100 REM DIRECTORY - JOSEPH
    R.CHARNETSKI
110 OPEN 1,8,0,"$":GET#1,A$,A$
120 GET#1,A$,A$:IF A$=""THEN 180
130 GET#1,B$,C$
140 BL=ASC(B$+CHR$(0)):BH=ASC(C$+CHR$
    (0))
150 D$=MID$(STR$(BL+256*BH),
    2)+CHR$(32)
160 PRINT D$;:GET#1,D$:IF D$<>""THEN
    160
170 PRINT:GET E$:IF E$<>"Q"THEN 120
180 CLOSE 1:END
```

END

Blocks Free Viewer: This program is very similar to the one above. However, instead of listing the directory to the screen, it determines the number of blocks free on the disk, putting that number into the variable F. You can use it as a subroutine in another BASIC program.
Geoff Larsen
British Columbia, Canada

```
100 REM BLOCKS FREE - GEOFF LARSEN
110 DEF FN A(X)=ASC(A$+CHR$(0))+256*
    (ASC(B$+CHR$(0)))
120 OPEN 1,8,0,"$0":GET#1,A$,B$
130 GET#1,A$,B$:IF FN A(X)=0 THEN 170
140 GET#1,C$,D$
150 GET#1,E$:IF ASC(E$+CHR$(0))THEN
    150
160 GOTO 130
170 A$=C$:B$=D$:F=FN A(X):CLOSE 1
180 PRINT F;"BLOCKS FREE ON DISK"
```

END

Comparison: The two programs above have much in common and you can learn quite a bit by comparing them. They were written independently by two different people, but they both read information from the disk directory and make that information available to a BASIC program.

Notice how one programmer uses a user-defined function, while the other doesn't. Try to see what is being read from the directory and try to relate it to the purpose of the program.

By analyzing programs like this, you can increase your skills significantly.
Louis F. Sander
Pittsburgh, Pennsylvania

Disk Drive Debugger: When your drive gets temporarily confused, you can reset it without touching the keyboard or risking the loss of your program. Just reach behind the drive and turn its power switch off. Wait a few seconds, then turn it on again. Your drive will be reset and your program will be perfectly safe, since the computer itself isn't affected.
S. Hartley Johnston
East Flat Rock, North Carolina

Television Interference: I have found an easy way to minimize the wavy lines often found when your computer is used with a television set. The secret is to shorten the wires that connect the switch box to the TV antenna terminals. Usually they are about four inches long, which is much longer than is needed. I cut them down to an inch, then hook them to the antenna terminals. I've done this every place I have moved and it never has failed me yet.
Robert Huey Atlantic
City, New Jersey

Feeding Bottom Feeders: The bottom feed printer may be the greatest thing since sliced bread, since it eliminates the possibility of paper feeding out and back into the printer. But feeding the paper into that bottom slot can be an absolute pain, as I discovered the second time I spent 15 minutes loading a new stack of paper.

The solution is to tape the first sheet of the new stack to the bottom of the last sheet of the old stack. Just make sure the tape doesn't overlap the feed holes or protrude past the edges of the paper. I've been using this method for several months now and I've had no trouble loading paper.
John R. Stevenson
APO New York, New York

Okimate Color Printing: When printing in color on the popular Okimate 10 printer, transparent sheets work much better than smooth paper. They are the same size as regular paper,

and are available from most office supply stores. Ask for the transparencies used in overhead projectors.

Once the sheet is in the printer, set the darkness control to the darkest position. When the printing has finished, put a sheet of white paper behind your transparency and notice the beautiful improvement.
Dave Danielson
Brookfield, Illinois

Power for That Interface: Most printer interfaces come with an ungainly power cord that attaches to your computer's cassette port. If you're capable of soldering wires to PC boards, there's a good chance you can do away with the cord. Here's how.

On many printers with a Centronics-type interface, pin 18 of the printer connector is wired to the +5 volt power supply and can be used to power your interface. If your printer has this feature, it's not very hard to eliminate the need for the cassette port connector. Just cut the wire that goes to the cassette port connector and resolder it to pin 18 of the printer connector.

You must be *very* careful about wire colors when making this change, especially with Cardo interfaces. On mine, the power wire is white where it connects to the cassette port connector, but it's blue inside the interface. You also need to be careful when identifying pin 18 and when soldering to the interface board. None of these things are very difficult, but they do require that you work as cautiously as you can.
Victor H. Pitre
Castle Shannon, Pennsylvania

SX-64 and Printer Interface: The popular SX-64 computer has no cassette port, so there's no obvious way to pick up power for printer interfaces and other units that come with a cassette port connector. But never fear—there are many other places to pick up your +5 volts.

The first is the user port. Pin 2 of this port is a source of +5 volts, suitable for your interface. If you have an edge connector to fit the user port, just wire it to your interface. If you can be satisfied with a less elegant solution, take a hacksaw to the cassette port connector on the interface and make it fit the end of the user port. Never plug it in backwards and you should be able to use it without trouble.

Pin 7 of the joystick port is another convenient source of +5 volts, and suitable connectors are available at Radio Shack.

Finally, you can use pins 2 and 3 of the cartridge port. Dismantle an old cartridge, connect your interface to pins 2 and/or 3, and you're in business again.

Although these three places are convenient sources of +5 volts on the SX-64, you should be careful how much current you attempt to draw from them. The built-in power supply is not very hefty, and if you tax it very heavily, you run the risk of blowing it. If your printer has its +5 volt power supply connected to pin 18, as many of them do, you should consider drawing your power from that source instead of the SX-64.
Jim Rozum
Emsworth, Pennsylvania

Modem Hang-up: With most terminal programs on most systems there is an easy way to force your Commodore 1670 or Hayes-compatible modem to hang up the phone and disconnect you immediately. Just type three plus signs and wait for about a second. The modem will send you a 0 or an OK. (Don't confuse it with anything you might be normally reading on your screen.) Once you receive that signal, just type ATH and hit RETURN. The modem will immediately hang up the phone! Those lucky enough to have a Commodore 1670 don't even have to type the ATH.
CURVE
Glen Allen, Virginia

More on Magazine Entry Programs: These programs, printed in every issue of this magazine, are wonderful aids to accurate typing. But sometimes I want to customize a line of a program as I type it, and the Magazine Entry Program doesn't want to let me.

I've found that putting a space before the line number will let any line be entered without being run through the proofreader. So when I want to customize a line, I put a space before its number. If the line is a complex one, I enter it first without the leading space, so the proofreader will check it for accuracy. Once the line is in memory, I use the screen editor to delete the checksum and make my customization. Then I insert a space before the line number, pressing RETURN to enter the modified line.

Putting a space before the line number is also useful when a line is so short it doesn't need to be checked. Many such lines consist of just the keyword RETURN or NEXT.

One last thing—never, never, never run a program that you just typed in without saving it first. Errors in the program can wipe it out of memory or lock up your computer. If the program has been saved first, you can reload it and work on correcting the errors.
Jeff Fox
Los Angeles, California

GEOS Pixel Editing: If you have finished detailed work in the pixel edit mode, but there is more to be done outside the magnified area, just click on the four arrows in the *geoPaint* tool box. This will take you out of pixel edit mode and let you move the editing box on the screen to the place you want to continue your editing. This is easier and faster than double clicking the pencil icon on and off to get into and out of pixel edit mode.
Chris McAlister
Knoxville, Tennessee

***The Newsroom* Borders:** Borders are a common feature of desktop publishing packages, but the popular *The Newsroom* program seems to lack this option. But you can create a very nice border by selecting the Old English font and typing a series of dashes! Alternate other punctuation marks for an even more decorative look.

Borders can also be created with the BOX function. Frame your work with a box then frame it again with a second smaller or larger box. You can then fill the areas between them if you'd like.
Craig Edward Given
Chattanooga, Tennessee

***Paperclip* Bug:** This powerful and popular word processor contains a bug that can cause a crash in the middle of editing. When the end of the file happens to fall in the fortieth column, any deletion that involves the final character will cause the program to lock up. The only way out is to turn the computer off, losing everything in memory.

If you keep a return character as the last character in your

Tips & Tricks

document, this bug will never cause a crash.
Art Kohn
Duke University
Durham, North Carolina

***Fleet System 2* End of Document:** This excellent word processor lacks a command to take you to the end of the document, but you can fake one if you know what to do. Just use the <FCN> h command, without using <FCN> f first. In effect, you're asking the computer to hunt for nothing. It immediately searches the document, finds nothing, and stops at the end of the page.

I find this much easier than scrolling up and down or using the jump feature, especially when I'm opening up a document in progress and want to continue where I left off.
Harry Calhoun
Pittsburgh, Pennsylvania

Faster Execution: There are many ways to make your BASIC programs run faster. Here are some of the more popular ones.

Delete all unnecessary spaces and REMs from your program.

Put frequently-executed subroutines at the beginning of the program, using a GOTO to skip over them when the program is run.

Put DATA statements at the beginning of the program, right after the subroutines.

If certain variables are referenced frequently, use a line early in the program to assign them their initial values, even if these are zero. The earlier a variable is defined, the faster BASIC can reference it.

When assigning a zero value to a variable or when using zero as an argument in a function, type a decimal point instead of the numeral zero. The computer treats the decimal point as a zero, but reads it considerably faster.

In FOR-NEXT loops, type the NEXT without the variable name.

In a series of IF statements, make the first one the one with the greatest probability of being true.

Replace IF statements with ON-GOTOs where possible.
Timothy Sullivan
Brooklyn Park, Minnesota

Speed Testing: When trying to speed up a program, it's common to read the TI variable at the start and end of the section you're working on. A simple subtraction tells how many jiffies the section took to execute. I've found it useful to GOSUB to a beep routine whenever I read TI for those purposes. While the TI numbers give an accurate measurement of elapsed time, it's easier to relate to the time between the two beeps.
Cathy Husser
Lynchburg, Virginia

ADSR Table Maker: When using sound on Commodore computers, you always need to choose values for ADSR (attack, decay, sustain and release), then set them by using the appropriate pokes or other means. When doing this, it's very helpful to have access to a table that shows the attack, decay and sustain times that correspond to the various settings between 0 and 15 (the sustain setting, of course, is a volume, not a time).

If you have a printer, the accompanying program will make such a table for you. When using it, remember that a second contains 1000 milliseconds. Ten milliseconds equal one one-hundredth of a second, a hundred milliseconds equal one tenth of a second, and so forth.
Louis F. Sander
Pittsburgh, Pennsylvania

```
100 REM ADSR TABLE - LOUIS F. SANDER
110 FOR J=1 TO 16:READ K:CS=CS+K:NEXT
    :RESTORE:IF CS<>18942 THEN PRINT"
    [DOWN]DATA ERROR":STOP
120 OPEN 4,4:CMD 4:PRINT" ADSR
    DURATIONS IN MILLISECONDS":PRINT
130 PRINT"VALUE[SPACE4]ATTACK[SPACE2]
    DECAY[SPACE2]RELEASE"
140 FOR V=0 TO 15:PRINT V;"[SPACE3]";
    :IF V<10 THEN PRINT" ";
150 READ T:FOR N=0 TO 2:D=T
    :IF N THEN D=3*T
160 D$=RIGHT$("[SPACE4]"+STR$(D),6)+"
    [SPACE2]"
170 PRINT D$;:NEXT:PRINT:NEXT:PRINT#4
    :CLOSE 4
180 DATA 2,8,16,24,38,56,68,80,100,
    250,500,800,1000,3000,5000,8000
```

```
100 REM C-128 TEMPO TABLE - SANDER
110 OPEN 4,4:CMD 4:PRINT,
    "NOTE DURATIONS IN MILLISECONDS"
120 PRINT"TEMPO[SPACE4]WHOLE[SPACE3]
    HALF[SPACE3]QUARTER[SPACE2]EIGHTH
    [SPACE2]SIXTEENTH"
130 FOR T=1 TO 60:PRINT T;"[SPACE3]";
    :IF T<10 THEN PRINT" ";
140 U=19220/T:FOR N=0 TO 4
    :D=INT(U/2^N)
150 D$=RIGHT$("[SPACE4]"+STR$(D),6)+"
    [SPACE2]"
160 PRINT D$;:NEXT:PRINT:NEXT:PRINT#4
    :CLOSE 4
```

END

Using ELSE and BEGIN: When using IF-THEN-ELSE and BEGIN-BEND in BASIC 7.0, the ELSE BEGIN clause must be in the same program line as the BEND, like this: 260 BEND : ELSE BEGIN. If the ELSE is on the next line instead, the statement(s) following it will always be executed.

I pass this on because I learned it the hard way, and it was a difficult problem to solve.
Steven Gollery
Hemet, California

Resetting the 128, Plus/4 and 16: If you have a program crash, the reset button on these computers comes in very handy. Hold down RUN/STOP while depressing this button and the computer will go into the machine-language monitor without disturbing anything in memory. To get back to BASIC type an X then press RETURN. Unless your crash was particularly disastrous, your BASIC program will be intact.
Norman Bungay
Newfoundland, Canada

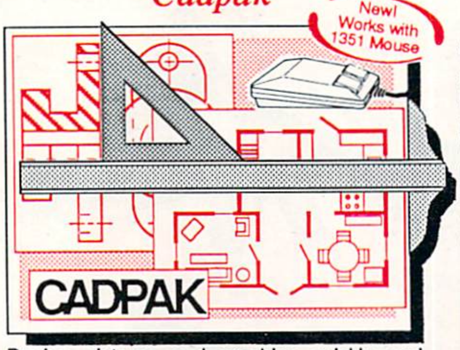
Machine Identifier: If you need to find out if a program is running on a 64 or VIC, there are many methods you've already seen. The method described here is unique in that it is also useful beyond identifying the computer. The test below will return the screen width in the variable S! By using the Ker-

Continued on pg. 127



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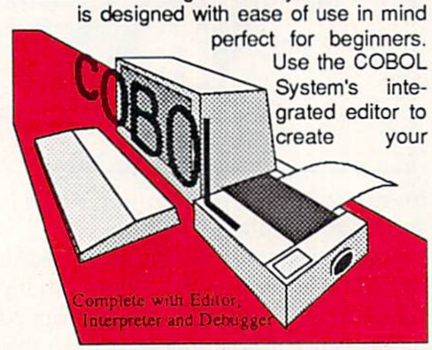


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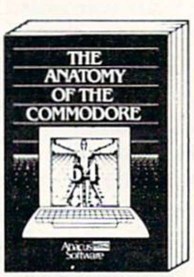
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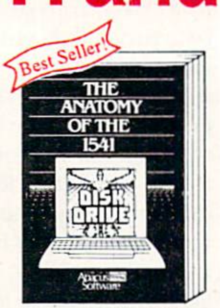
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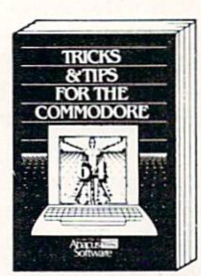
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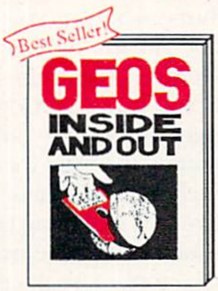
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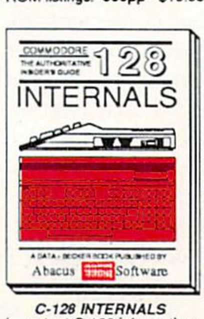
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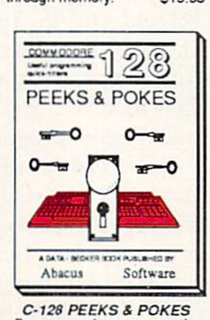
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REVIEWED BY PETER DEAL

Turbo ROM



JOHN DZEDZY

Computers: Commodore 64, Commodore 128
Manufacturer: Cockroach Software
Distributor: Kobetek Systems Ltd. 1007 Commercial Street New Minas, N.S. B4N 3C5 Canada
Price: $40

The Cockroach Turbo ROM is just one of the many ways to speed up your disk drive. It loads, saves and verifies five times faster than normal. It also has an optional fast disk formatting, which takes only 30 seconds, a built-in DOS-wedge for easy access to disk commands, a screen dump, and three more commands: ZAP, OLD and MON. Unfortunately, the Turbo ROM only speeds up program files, not sequential or relative files.

The Turbo ROM also saves five times faster, and files that were saved using the Turbo ROM also load about 8% to 10% faster when using the ROM—but otherwise load normally. When you save, the Turbo ROM checks if there is enough room on the disk before saving—which is quite often very helpful. Also, the Turbo ROM has coded around the alleged save-with-replace bug (SAVE"@ name",8) by scratching the file that exists and then saving the file in memory.

If you wish to (heaven forbid) load normally, you simply flick a switch and reset the 64. Of course, the only reason anyone would want to do that is if there is a program that the Turbo ROM can't load—and those are few. Some programs were designed to use the long loading time to, for instance, display instructions on the screen—such programs now work too fast. If they can't be changed, turning Turbo ROM off is an easy way out. But there is one more reason. In order to have the extra commands built-in, the programmers had to leave something out: all the tape and RS232 routines, meaning you can't use a modem or a cassette drive.

The Turbo ROM's screen dump simply dumps the contents of the text screen onto the paper. Closing the printer channel is simple—a two-keystroke command replaces the longer PRINT#1:CLOSE1 syntax.

I use two 1541 drives and a 1525E printer or a 4022 printer hooked to the 64 by an IEEE interface (no bit-mapped mode here). I was amazed to see that Turbo ROM had no trouble dumping the screen to the IEEE printer—it looks like a well-built piece of software!

The Turbo ROM's DOS wedge is (besides the fast loading) my favorite part. It allows you to easily access the disk, to do things such as viewing the directory, checking the disk status, scratching files, renaming files, validating the disk, formatting the disk—the list goes on.

Another useful feature is that the Turbo ROM lets you use two disk drives, one labeled as device 8 and one as device 9 (hence, the LOAD"name",8 or LOAD"name",9). However, if you are only using one drive, you are allowed to skip putting the ",8 at the end of a command, such as LOAD"name. It is often possible to even skip typing LOAD. If you need to load a certain file on the disk, just get a directory, move the cursor up to the program you want to load, and type SHIFT and RUN/STOP at the same time. The Turbo ROM prints out the LOAD and the ,8,1. All you do to load it is press RETURN. Yet another useful feature of the Turbo ROM is that you can simply type * then RETURN, and the Turbo ROM will load the first program on the disk.

Turbo can actually change disk device numbers (@ changes 8 to 9), and it's not limited to just accessing a previously set device number. Defaults as to which device is currently active exist, and can be easily overridden by one POKE instruction, a very useful feature.

Typing ZAP and hitting RETURN will give you a warm start, just as if you turned your 64 off, then back on. The OLD command is one of the most useful commands—after NEWing a program you can get it back by typing OLD. This also works after a warm start or reset.

MON commands gets you into a machine-language monitor. Turbo expects to see a monitor of your choice at either $8000 or $C000, and will perform fast loads and saves using the standard monitor syntax (unless a monitor is so badly written that it won't allow it, of course).

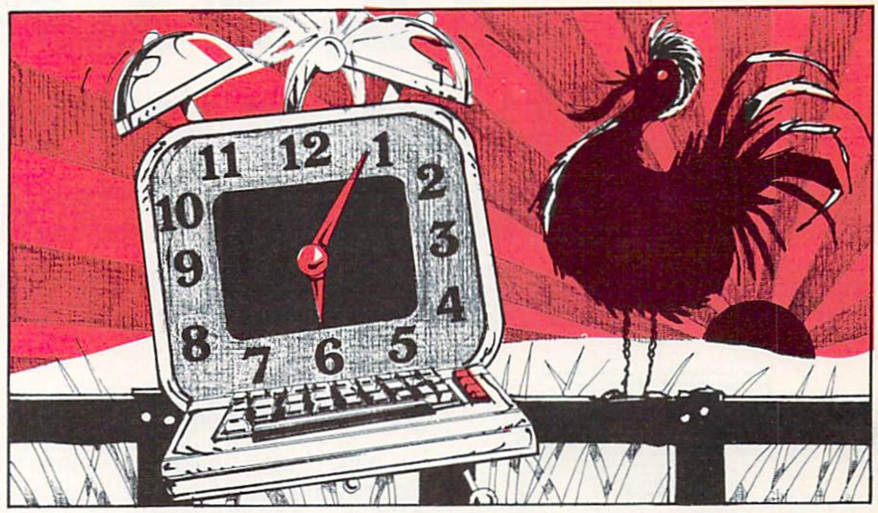
Now comes the tricky part: installing it in your 64. You have to open up your 64 **[Warning: This voids your warranty.]**, take out the 64's Kernal ROM, and put in the Turbo ROM. The Turbo ROM also comes with a switch to determine whether you want normal disk access or to use the Turbo ROM. If you feel like drilling a hole in your 64 (like I did), than you have a perfect home for your Cockroach Turbo ROM. But if you don't feel like drilling a hole for the switch then it doesn't really matter—all you have to do is have it hanging out one of the ports in the back.

The instructions that come with the chip are complete. This is true of both the installation part and the use commands. The Turbo ROM may set you back alittle financially, but it is definitely worth it. If you also want your own colors and your name on the screen at power-up, there is also a version for $45. Either way, the Cockroach Turbo ROM is worth every penny. There is also a version available for the 128.

REVIEWED BY TIM JONES

TIC

Computer: Amiga
Manufacturer: Byte by Byte
3736 Bees Cave Road
Suite 3
Austin, TX 78746
Price: Not available



At the 1987 Winter CES, Byte by Byte demonstrated a device that could possibly become the most popular hardware addition that Amiga owners have seen to date. The device is called TIC, and of all the goodies I've seen come out for the Amiga, this one promises to be the most ingenious.

TIC itself is approximately 1.5-inch square and .75-inch deep, and plugs into the second game port behind the mouse. Inside the package is a battery-backed clock/calendar. If you've been getting sore at the prospect of installing a user-entered date/time routine in the startup sequence of all of your WorkBench disks, TIC is just what you need.

The game port design allows TIC to function with any other devices that you may have connected to your serial, parallel or expansion ports, with one exception—the Sidecar. Due to the way the Sidecar is designed, both mechanically and electronically, TIC won't plug into the second game port and cannot be read if it is attached with a joystick extension.

As for compatibility with other software, the first problem that you might expect to see is a conflict between the TIC and programs that use devices like dongles (for protection) or joysticks which plug into the second game port. I can happily say that I have had no problems with TIC and *Leader Board* (dongle), *SuperBase* (dongle), or *Adventure Construction Set* (joystick). The unit's electronics are fully buffered, so there are no problems with removal or replacement while your Amiga is powered up.

To make installation of TIC simple, Byte by Byte has included a program that will append the proper command to your startup sequence to allow your Workbench to automatically read the TIC upon boot-up. The only thing that you must do is to copy the actual TIC program to your C directory (or wherever you may want it).

If you've been getting sore at the prospect of installing a user-entered date/time routine in the startup sequence of all of your WorkBench disks, TIC is just what you need.

The commands to use TIC revolve around the TIC program. You use TIC GET to set your system time and date from TIC, or TIC SET to set TIC's time and date from your system. Under WorkBench, you click the TIC icon and you are greeted with a window with gadgets to allow you to set or read TIC, depending on what you need to do. If you are using the CLI, both functions operate properly with a redirection file, so you can use TIC > NIL: GET to set the time without displaying the results to the screen during boot-up, or you could use TIC > S/Now GET to set the system time and place the current date and time stamp onto your SYS: disk.

Included on the TIC disk are the TIC program, a program called ScreenSaver, and a new version of the ever-popular clock called TimePiece. Also, all documentation is presented in the format of Byte by Byte's *InfoMinder* information management program. This makes the information easy to follow, thanks to the logical manner in which *InfoMinder* handles the information. If hardcopy is a must for you, however, *InfoMinder* will allow you to print the documents.

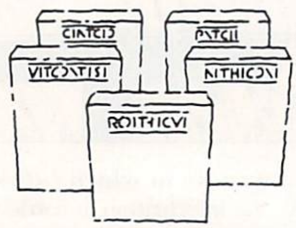
The new version of the clock allows you to actually set the time by grabbing the hands and moving them to the appropriate locations on the clock face (the way most of us assumed the original was supposed to work). If you use this program to manipulate the system time, there are menu selections to allow you to store the time in TIC and reset the time from TIC. The clock can be displayed as a standard analog face clock, a combination analog/digital clock, or a digital-only clock. In all three modes, the clock is fully resizable and the digits of the digital clock are drawn to fill the display, no matter how large you make the window.

The ScreenSaver program runs as a background task and monitors your system. If there is no mouse or keyboard input for over three minutes, ScreenSaver blanks your display, lessening the chance of phosphor burn. If you are constantly leaving your system on with a static display, this little program can add many hours to your monitor's life expectancy.

All things considered, TIC has got to be one of the best values for your Amiga—both in cost and in usefulness. For those of you that demand heavy criticism of products, I must apologize. Aside from the inability to use TIC with the Sidecar, I can find no other complaints to give you about this fantastic little device. I personally feel that TIC is a must-buy for all Amiga owners simply because it allows you to get the most out of your system for the least amount of money. C

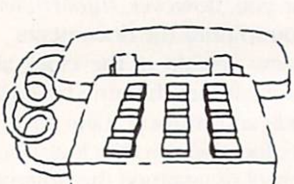
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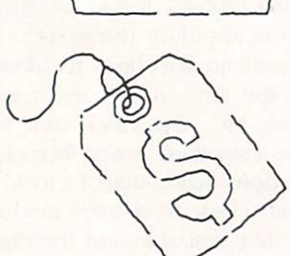
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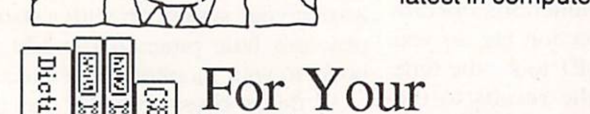
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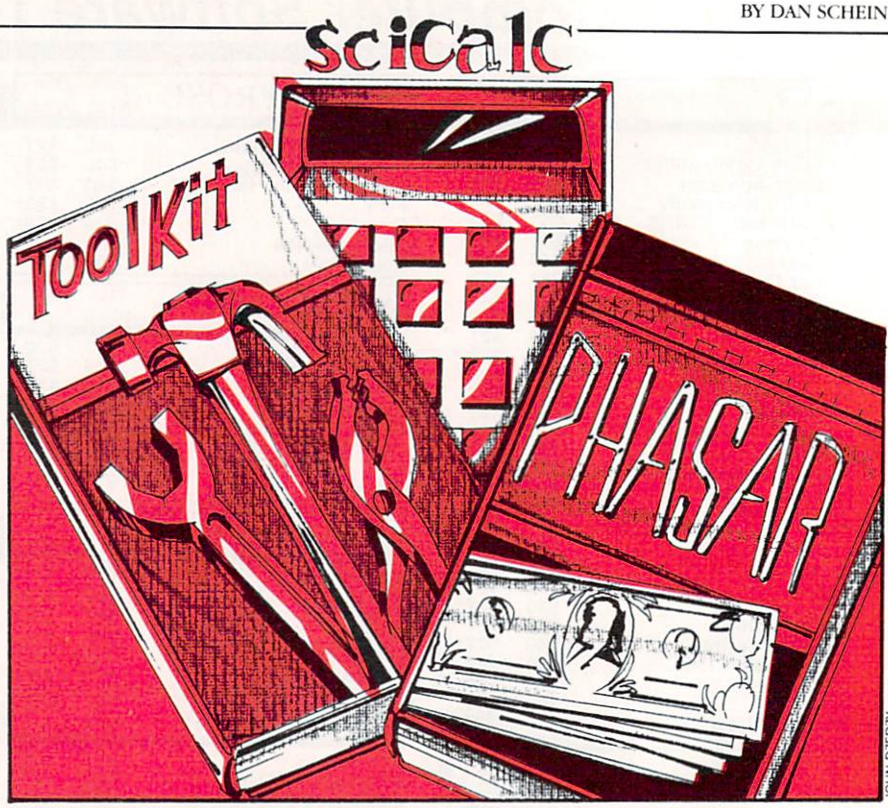
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BY DAN SCHEIN

Tech Notes

A Look at the Latest



JOHN DZEDZY

This month I'd like to mention some interesting Amiga programs that have crossed my desk.

SciCalc is a calculator from Deskware. This utility can be sized from a full scientific calculator down to a four-function standard calculator by using the window-size gadget. Options include automatic constant, polar/rectangular conversions, two-dimensional statistics, plus more. In case you do not know how to use some of these functions, a very nice manual is included.

SciCalc only uses 41804 more bytes than the original Amiga calculator. This is a lot of power for a little memory space. This program and its icon come on the disk ready to be copied (or dragged by the icon if you prefer) onto any disk you want. If you need more power than the Amiga calculator, you can't go wrong with *SciCalc*.

Toolkit is a collection of additional AmigaDOS commands and utilities from Metacomco. Included with *ToolKit* is a manual that explains how and where to install these files on your WorkBench disk. The quick reference and specification parts of the manual are set up like the AmigaDOS manual, making it very easy to follow. The new commands include ALIB (allows you to create, amend or extract an Amiga library module), AUX (similar to the device CON: except that the input and output go through the serial line port and not a window), BROWSE (allows you to view a file, but with some extra features and creates a new full-size window to display your file. The contents of this window will not scroll off the screen until you request. At the end of each screen you will see the request MORE ?, and at this point you have 11 options available to you. These options range from quit and continue to skip and search), DISASM (disassembles an object module, both Amiga and non-Amiga formats), ENLARGE (prints a string of text in a very enlarged form), MOUNT (allows a new device to be mounted and available for use), PACK (translates a text file into a compacted form. Pack will also work with non-text files, but the size reduction is not as good), PIPES (allows the output from one task to be transmitted as input for use by another task), and UNPACK (regenerates a text file from a compacted form).

Overall, these are some good features that work well. A word of caution to those using AmigaDOS V1.2—the MOUNT command already exists on your Workbench disk as does the file called MOUNTLIST. Care should be taken not to replace your 1.2 versions with the ones included on the *ToolKit* disk.

Phasar is a powerful financial manager for professional or home accounting from Marksman Technology. The program takes full advantage of the Amiga's mouse under WorkBench V1.2. If you do not have WorkBench V1.2 or you like to use the keyboard, that option is also available. This program is not shipped on a WorkBench disk, so you will have to boot your Amiga from a WorkBench disk and then change disks if you only have one drive. If you have two disk drives, place the *Phasar* disk into your external drive. *Phasar* is then activated by double-clicking its icon.

The manual is very easy to follow and takes you through a very complete tutorial. I spent five hours going through part (yes, only part) of the tutorial, but those five hours felt like only two. The number of expense and income categories, plus the many ways you can combine and split these categories, make this a very smooth program. Other features include a built-in calculator that can be accessed at any time from inside the program without affecting your other data, the option to add comments to your transactions, and the ability to split one transaction between several categories. If you are looking for an easy to learn yet powerful accounting program for your Amiga, look into *Phasar.* This is one of the best I have seen so far. ■

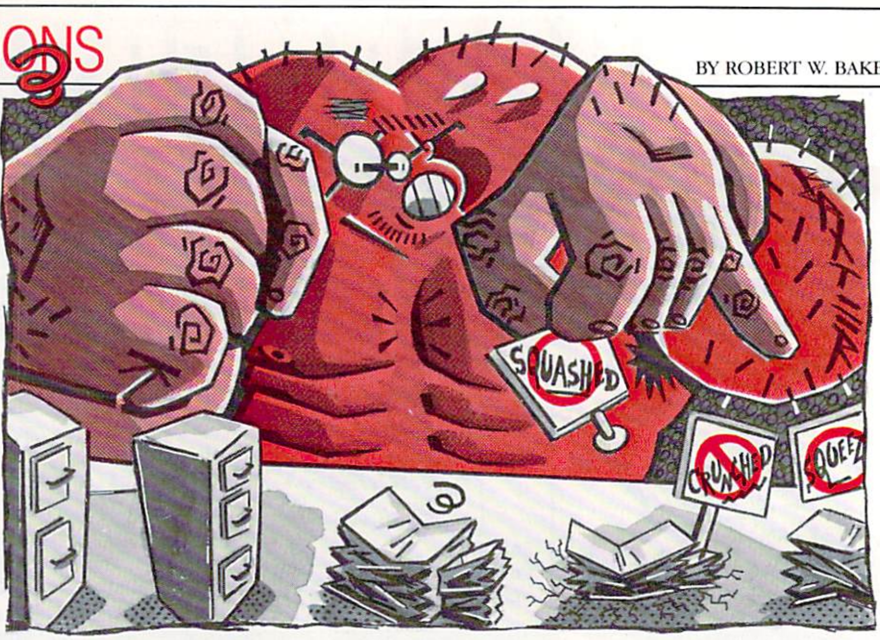
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St. Petersburg, FL 33743

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BY ROBERT W. BAKER



ART BAXTER

Inside QuantumLink

Explore the inner workings of the QuantumLink telecommunication service with network pro Bob Baker.

Most users are well acquainted with the various utilities used in transferring files to and from QuantumLink and various BBS systems. ARC, LYNX, LIBrary and other utilities all make it much simpler for transferring related groups of files or compressing large files to save transfer times. Well, now there's something new from the originators of the ARC utility—self-dissolving ARC files, otherwise known as SDarchives or SDA's.

Self-dissolving ARC files are usually identified by their SDA suffix in the filename and are much easier to use. However, SDarchives are limited in size and how they can be created or dissolved. The big advantage is that the ARC utility is not used to dissolve an SDA file. You simply load the SDA file into memory and run it in order to dissolve the file into the individual pieces. Nothing could be simpler.

There are several restrictions to using SDarchives, besides requiring a revision 2.30 or later of the ARC utility to be able to create them. First, any given SDA file can only be used on the specific system it was created for. Thus, an SDarchive for a 128 can only be used on a 128 system, a PET SDA file can only be used on a PET system, and so on. Be sure to check any comments associated with an SDA download file to be sure it can be used on your system.

Another limitation is that the total size of the SDA file cannot exceed a specific size that would prohibit the file from being loaded completely into memory. The specific maximum limits for each system are 223 blocks for 128 systems, 201 blocks for 64 systems, and 119 blocks for PET systems. These limits include four blocks for the special SDA header that is included in the SDA file when it's created.

Along these same lines, the SDarchive cannot contain any crunched files. However, the SDarchive can contain any combination of stored, packed, squeezed or squashed files. The reason is that crunched files require about 28K of RAM as workspace, and there just isn't enough space left over to handle it.

Creating an SDarchive is really pretty simple. First you select the proper version of the SDA header program for the desired system: 128, 64 or PET. Remember to make a copy of the SDA program file since it will be used up by the SDarchive process.

Next, rename the copy of the SDA file to the name of the archive you want to create. The name you choose must end with the .arc filename extension. Now use ARC 2.30 (or a later revision) to append to the SDarchive using the ARC/AZ command. Finally, rename the file with the .sda filename extension to identify it as a self-dissolving arc file when done.

To copy the SDA header:

```
>c0:newfile.arc 0:sda230.64
```

To make archive:

```
arc/az newfile oldfile(s)
```

To rename it:

```
ren newfile.arc newfile.sda
```

That's all there is to it! But before you upload or distribute the SDA file, be sure to load and run it to check that it works correctly. You never know what might go wrong.

When you run an SDarchive, it assumes that the archive follows immediately after the SDA header program. Make sure you avoid using XMODEM to transfer the SDA program (in un-ARCed form) because this will change its file size and it will think that the XMODEM padding is the first archive entry.

The very first file in the SDarchive is not extracted to disk, but is displayed on the screen instead. This first file can be squeezed or squashed, and normally would contain instructions for the user, copyright notices or whatever you think is appropriate.

After displaying the first file, SDA waits for a key to be pressed. If the RUN/STOP key is pressed, then SDA aborts and just goes to the READY prompt without extracting the SDarchive. If any other key is pressed, SDA starts extracting the remaining files and writing them to the disk in drive #0 of unit #8. As the files are extracted, you'll see the names of the files being created and an indication whether the checksum is good (ok) or bad (?).

All pretty simple, isn't it? Everything you need is contained in a single download SDA file that is available in the Telecommunications PD library on QuantumLink. It contains full documentation plus copies of all available SDA program files.

Hot Off the Wire

You'll find the Disabilities Club tucked away in the Clubs & Special Interests Support Center of Just For Fun. Q-Link created this area to cover a wide variety of subjects, with message boards, special download file areas, and bi-monthly online meetings all hosted by QHawk and Shy Sparrow.

When you enter the Disabilities Club area, you'll find the usual welcoming text plus areas for announcements and scheduling; a directory of members; bulletin boards for questions and answers; a trading post; movie reviews; plus the information center download libraries separated for agency referral lists, suggested reading and general information.

The message boards offer a chance for users to share thoughts regarding disabilities. If you are disabled, have a disabled friend or loved one, or are involved in Helping Services, you're invited to leave messages here.

The bi-monthly meeting offers the opportunity to share and exchange information live. Topics include the areas of physical and mental disabilities, special education for learning disabled children and adults, the disabled veteran, employment for the handicapped, information for persons injured or disabled on the job, and many others. Additionally, you'll find information regarding special computing and telecommunication services for the disabled.

Download files will include state-by-state laws concerning disabled persons, as well as referral information and services available through national agencies. This information is hoped to be completed by September 1st and file updates will be done on a regular basis. All users are invited to add any information they can to this expanding area.

One of the more interesting download files currently available is an animated sign language program called Finger Spelling. This program shows an illustration of sign language with moving hands and fingers portraying the words and phrases that go with the translation.

Text files cover a wide variety of subjects, such as birth dilemmas affecting newborn infants and their families. Reference material covers such topics as recreation and sports organizations for sight-impaired persons. BBS phone numbers for specialized handicapped interests, publications, reading lists, suggested books dealing with various disabilities and handicaps are all here. Reports on the diagnosis and treatment of dyslexia and a special article on the Dyslexic College, the nation's only university exclusively for persons suffering from this affliction, are also highlighted.

Product review files cover items like the Brain Sensor, a pressure-regulating device allowing relief and treatment for persons having brain tumors; and the Eye Types, a breakthrough device allowing handicapped persons to type by way of eye movement. Other articles dealing with computer accessibility for handicapped individuals and computers in special education are now available.

Back in March, Q-Link was in the midst of restructuring the CIN SIG areas again in an attempt to make them much more useful. They were restructuring the message boards, creating Workshop and Archive areas, plus building a new Community Center where all Commodore owners can gather. There should be a new conference center for meetings plus a local pub as a leisure gathering place. Another area will provide industry news, views and discussion topics on the ever changing computer industry.

I've been getting plenty of feedback via EMail lately and I greatly appreciate the input. Your questions, comments and suggestions are always welcome and I'll continue to try and respond in a timely fashion whenever I can. C

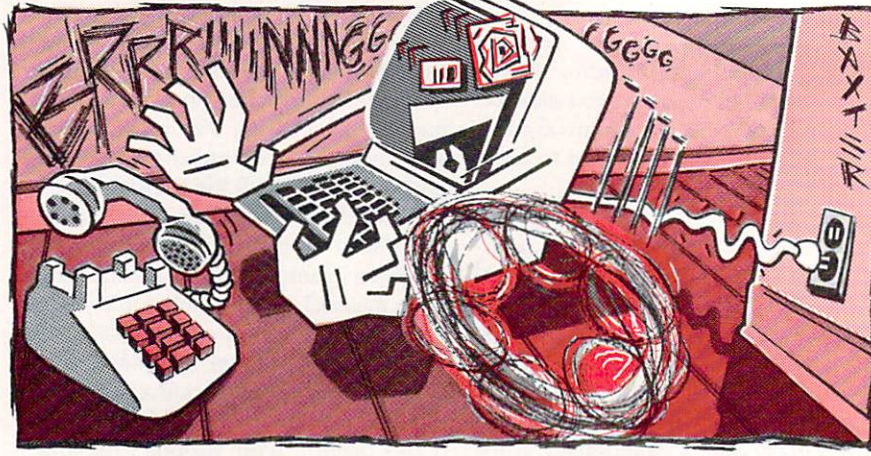
Bob Baker is in charge of the New Products Information area on the QuantumLink network. He can be reached on Q-Link via E-Mail addressed to RBAKER.

BY SUZANNE McCOACH AND DAN SCHEIN

Connect!

A Guide to Telecommunications Literacy

Become an on-line expert in this ongoing telecommunications tutorial.



ART BAXTER

In the next few columns, we will answer the most commonly asked questions.

Q: How can I get my 1670/Modem 1200 to stop answering the phone?

A: There are several options available to stop the 1670 modem from answering the phone. First is the modem's built-in ATS0 command. This command controls the number of rings allowed before the modem auto-answers. The syntax (explained in your 1670 manual) to disable auto answer is ATS0 = 0. You have two options for using this command. If you are using a terminal program (like *Common Sense*), simply type the command in upper-case and press RETURN. If you are not using a terminal program, you can get the same result by entering the following two-line BASIC program. If you have a 128, this program can be placed on a disk and made to autoboot upon power up. See your 128 manual for details.

```
10 OPEN2,2,2,CHR$(6)+CHR$(10)
20 PRINT#2,"ATS0 = 0":CLOSE2
```

The non-answering mode is only temporary and is lost when you turn off or reset your computer. If you want a more permanent or hardware type of ring suppressor, you can get them from several companies. The most common is a ring suppressor from Radio Shack that stops a telephone from ringing. Installation consists of removing the cord currently going from your modem to the wall connector and replacing it with the ring suppressor. The ring suppressor looks like a phone cord with an on/off switch. This switch is used to stop the phone (or in this case, modem) from ringing. This in effect stops the modem from answering the phone.

Q: I have hooked up my modem to my computer, and hooked up the phone line to my modem. But I can't get the modem to work.

A: The one thing you need is a telecommunications program (terminal program) to send and receive commands to your modem. All Commodore modems come with a telecommunications program.

Q: My friend has a really nice terminal program that works with his modem but not mine. Why?

A. Most telecommunications software is designed to work with only one model of modem. If you and your friend have different modem models, that is most likely your problem. If the telecommunications program has an option to select the modem type, make sure that your exact model of modem is selected.

Q: I have had some problems getting my new modem to work with my computer. When I connect to another computer system, all I receive is garbage on my screen.

A: Miscellaneous and/or intermittent garbage is most often caused by a scratchy phone line. Your problem of all garbage might indicate that your terminal settings are not set correctly. Try setting your telecommunications software to one of the following. These are the most commonly used settings.

- 8 DATA BITS, NO PARITY, 1 STOP BIT
- 7 DATA BITS, EVEN PARITY, 2 STOP BITS
- 7 DATA BITS, EVEN PARITY, 1 STOP BIT

Most systems use one or more of these settings. It is recommended that you sign off the system (if you are connected) and reset the software before changing your settings. Another thing is to be sure that you and the system you are calling both are using the same baud rate. Both computers must be set to the exact same baud rate. For example, you cannot call a system running at 300 baud with your modem and software set to 1200 baud—all you will receive is garbage.

Q: Sometimes my phone line disconnects for no reason.

A: Getting disconnected while connected to another computer may be one of those things you have no control over. Often static and noises in the phone line cause one of the computer systems to hang up. But if you have call-waiting on your phone line, that is a likely suspect. Call-waiting can be temporarily disconnected in most areas of the country by entering a special series of numbers right before you place a modem call. For more information on your area, contact your local phone company. One final thing: Do not overlook the phone jack(s). Make sure that the phone cable(s) is connected securely in the jack(s). Also, some BBS's have time limits on a call. It is possible that you have reached your time limit and the BBS logs you off with no log-off message.

Q: At 1200 baud, the information displayed on my screen scrolls by too fast for me to read it all. How can I slow it down?

A: You cannot really slow the infor-

Continued on pg. 101

BY IAN ADAM

Getting It Straight

Scaling the 128's Screen

The Commodore 128 has all the graphics commands you need to be able to create good high-resolution screen images with circles, boxes, lines, and so on. With a few straightforward commands, you can take advantage of the graphics capabilities to produce professional-quality pictures in a way that is not possible with the 64.

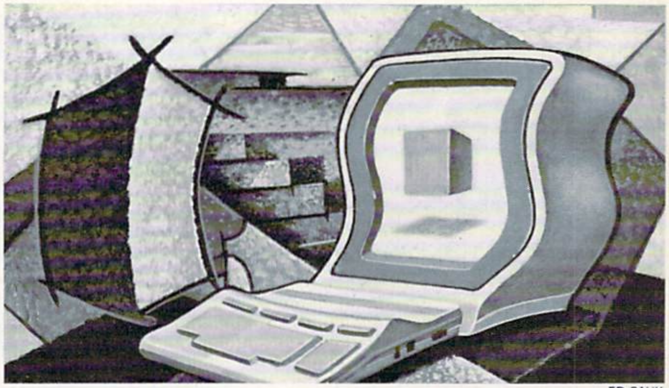
Good News, Bad News

However, when you use those graphics commands, you do discover one nagging problem—the pixels aren't quite square! This problem is not unique to the 128; in fact, it is common to many computers, and every monitor has its own particular aspect ratio. Each combination computer and monitor will result in slightly different proportions on the screen image. Well, maybe you don't really care what shape the pixels are—leave that to the technicians to figure out. But it does affect you, however, in the form of squares that aren't square and circles that look like eggs. On the 128, shapes typically turn out to be about 40% taller than they are wide.

Fortunately, the SCALE command provides a ready solution. This command allows you to preset the range of the X and Y coordinates to any values you select. This can be handy when you want to plot data that is too big to fit readily onto the 320 by 200-pixel screen. It also provides a straightforward way to adjust the screen proportions.

Scaling can be invoked in two ways. A simple SCALE 1 will turn on the default scale of 1023 by 1023 points. This means that a line 1023 points long will fill the screen or a circle 102 units wide will be one-tenth the width of the screen. Alternatively, SCALE 1,X,Y lets you specify your own maximum values; subsequent horizontal measurements will be scaled down from X to 320, verticals from Y to 200. The larger the number you specify, the more the resulting plot will be scaled down to fit. Scaling is turned off by a SCALE 0 command, or simply by clearing the graphics screen.

So by selecting the appropriate X and Y values, you can correct for distortion in the screen image. But what are the correct values? Only trial and error can tell you precisely, as the correct answer depends upon your particular computer and monitor combination.



ED SAUK

Calculate a personal SCALE command for your combination computer and monitor.

The Program

To help out, I've prepared the accompanying program. This plots a simple test pattern, then allows you to adjust the scale until the squares are square. The program starts with a scale of 320,276, which should be pretty close to the correct answer in most cases. When the test pattern is drawn, measure the height and width of the shapes using a flexible ruler or the edge of a piece of paper. Press the plus sign to get a taller display, minus sign for shorter. Be sure to check the squares along both sides of the center, as the proportions may vary over the surface of the screen.

When the pattern is as close to true circles and squares as you can get, press Q to quit. The program will then print out your own personal SCALE command, which you should be sure to note down. Any time you want to write a graphics program, first clear the graphics screen with a GRAPHIC 1,1 statement, then include your SCALE command to set up the right range. Any plotting you do after that should have the correct proportions.

Getting the scale right on your 128 adds that extra touch of professionalism to your program—and allows you to make better use of those great graphics capabilities. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Getting It Straight

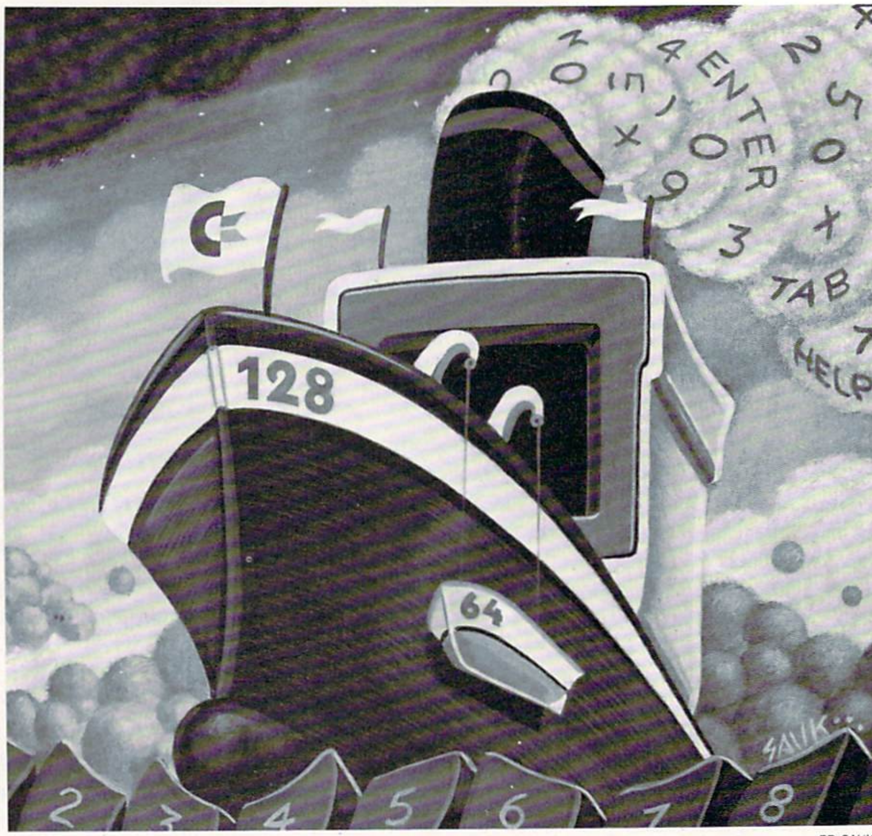
```
100 COLOR 0,1'BDPV
110 A$="[SPACE40]"'BCXC
120 PRINT"[CLEAR,RVS,L. BLUE]"A$"
    [SPACE3]SCALE FACTOR FOR THE
    COMMODORE 128[SPACE3]"A$'BEEJ
130 PRINT TAB(54)"BY IAN ADAM"'CDGC
140 PRINT"[DOWN2,L. RED]INSTRUCTIONS
    :"'BACE
150 PRINT"[DOWN]1. PRESS ANY KEY TO
    BEGIN."'BAGH
160 PRINT"2. MEASURE HEIGHT AND
    WIDTH."'BAUI
170 PRINT"3. PRESS + TO MAKE DISPLAY
    TALLER,"'BAJL
180 PRINT"[SPACE9]- FOR SHORTER."'BAJI
190 PRINT"4. PRESS Q WHEN SCALE IS
    CORRECT."'BAQN
200 PRINT"[DOWN2]INITIAL Y-SCALE
    : 276"'BAVB
210 :'ABHW
220 Y=276'BETY
230 GET KEY A$'CCEA
240 :'ABHA
300 DO'BAJW
310 :'ABHX
320 GRAPHIC 1,1'BDHA
330 SCALE 1,320,Y'BHUC
```

Continued on pg. 120

BY IAN ADAM

64-Mode Numeric Keypad

for the Commodore 128



ED SAUK

The Commodore 128 has 26 extra keys that are not present in the 64. Most notable of these is the numeric keypad, which includes the plus sign, minus sign, decimal sign and ENTER as well as the ten digits, for a total of 14 keys. In addition, there are four extra cursor keys and eight special keys reserved for functions such as TAB and HELP. These extra keys give the 128 a much more professional keyboard, and make many tasks much easier. In particular, entering numeric data is much faster, and word processing can benefit from the new function keys.

A Computer Within a Computer

Now, of course, the 128 has many advantages over the 64, yet I wager that most 128's spend a good part of their lives running in 64 mode. Why? Because there is such a vast selection of software available for the 64 and it will take some time for an equivalent number of 128-specific programs to be written. In addition, many 128 owners have moved up from the 64 and already have all their favorite programs written for the 64.

The problem, however, is that those 26 extra keys are not accessible when running in 64 mode. The designers of the 128 are justifiably proud of their handiwork (if you want to know just how proud, enter SYS 32800,123,45,6 in 128 mode!). They made 64 mode an exact replica of an actual 64, almost a computer-within-a-computer. It is such an exact replica that the extra keys are not scanned by the operating system. It would have been straightforward to read the extra keys, but the changes this would represent would have increased the danger that some programs might not run. In the interest of enhanced compatibility, the extra keys are ignored.

However, just because the keys are not used, that doesn't mean they can't be used! With the appropriate pokes and peeks, it is still possible to read all but one of the extra keys. One key is inaccessible. Marked 40/80 DISPLAY, it is read by the Memory Management Unit, which is disabled in 64 mode. Of the other 25, 24 are accessed through an extra register in the video chip, and one (the CAPS LOCK key) is read by the microprocessor itself.

Gain access to all the 128's numeric keys while in 64 mode.

You can try it yourself. In 64 mode this statement PRINT PEEK(1) AND 64 will print a zero if CAPS LOCK is pressed or 64 otherwise.

The Program

BASIC is much too slow to read the rest of the keys, so you need a machine-language routine. Once you figure out how to read the keys, it is not difficult to write a routine to do so. Presumably you could use it by making a SYS call, then decoding the result to get the key pressed. To be truly useful, though, the program should be more convenient than that. In fact, you shouldn't have to think about it at all when you use it.

I prepared the accompanying program to do this in as unobtrusive a way as possible. Once it's in place, you just use the extra keys the same as any others. The keyboard is normally scanned as part of the interrupt service routine, tasks which the operating system takes care of 60 times each second. The program to read the extra keys has been added in as part of this routine, so everything becomes auto-matic. There is a vector that points to the start of the code for the interrupt—address 59953 in the 64. This vector is changed to point to the program that reads the extra keys. If a key is found to be pressed, it is entered into the keyboard buffer in the normal way. If none of the extra keys is pressed, control is turned over to the normal routine to read the rest of the keyboard. The KEYLOG vector also had to be changed to deal with the CAPS LOCK key. All of this happens 60 times every second, but as I said, you don't need to worry about it, because it all happens automatically.

The program is very compact. It took

some effort, but I got it down to 255 bytes. There is a lot of competition for free RAM in the 64, and this size allows it to coexist with other programs that may need to use some space. The program sits at address 50944. If it should get disabled by pressing STOP/RESTORE, you can reactivate it by typing SYS 199*256.

What It Does

Simply put, the program reads all but one of the extra keys when the 128 is in 64 mode. I tried to make it as natural as possible.

Some of the keys have no equivalent in 64 mode, so they simply print their meaning to the screen. Here's how the extra keys work.

Numeric Keypad	Same as the corresponding keys on the main keyboard.
Cursor Keys	Same as main keyboard, except that you don't need SHIFT to move up or left.
ESC, TAB, ALT, HELP	Print their meaning to the screen.
CAPS LOCK	Works as a true caps lock. Unlike SHIFT LOCK, which shifts all keys, this shifts only the alphabet.
Line Feed	Ignores the line the cursor is on, and moves to the next line.
40/80 Display	Not active.
No Scroll	Press and release to freeze all activity. Press and release any key to resume.

As you can see, there are a few extra functions in there that you just don't get in a 64 otherwise. A true CAPS LOCK key is mighty handy if you're doing a lot of typing, since it doesn't affect the number and punctuation keys. And NO SCROLL—you can do lots of things with that. Halt a LIST to review it, freeze a game while you take a break, or stop output to make notes; even the internal clock stops when NO SCROLL is pressed. Because it is so powerful, it turns the screen border multicolor to remind you it's in effect. Press and release any key to continue where you left off.

That's about it. Just type the program in and be absolutely sure you save a copy before you run it. With the 128 in 64 mode, load and run the program. You can then load another BASIC program, or proceed into a programming session. As long as there is no competition between the programs, all the extra keys will remain active. I've also found it to be compatible with the Epyx *Fast Load* cartridge.

Having the numeric keypad active in 64 mode is almost like an extra mode for your 128, part way between a 64 and a 128. The extra functions afforded by some of the special function keys can also be very useful. I hope you find this new mode to be worthwhile. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

64-Mode Numeric Keypad

```
10 PRINT"[DOWN]64-MODE KEYPAD FOR THE
   C-128"'BARE
20 PRINT"[DOWN]BY IAN ADAM"'BAUB
30 PRINT"[DOWN]ONE MOMENT..."'BASD
100 FOR I=50944 TO 51198'DLUY
110 READ A:X=X+A'DFDY
120 POKE I,A'BDBX
130 NEXT'BAEX
140 IF X<>31976 THEN PRINT"DATA ERROR"
    :STOP'GHOH
150 :'ABHA
160 SYS 199*256'CGMD
170 PRINT"[DOWN2]KEYPAD ENABLED"'BATG
180 PRINT"[DOWN]ALL KEYS ACTIVE
    EXCEPT 40/80 DISPLAY"'BAUN
190 PRINT"[DOWN]CAPS LOCK
    : ALPHABET ONLY IN CAPITALS"'BASO
200 PRINT"LINE FEED: IGNORE LINE
    CURSOR IS ON"'BANF
210 PRINT"NO SCROLL: FREEZE ALL
    ACTIVITY"'BAXF
220 END'BACX
230 :'ABHY
1000 DATA 120,169,21,141,20,3,169,199,
     141,21,3,141,144,2,169,191,141,
     143'BMEF
1010 DATA 2,88,96,32,234,255,160,0,
     140,47,208,136,140,0,220,204,1,
     220'BJAF
1020 DATA 208,6,140,47,208,76,52,234,
     132,203,200,140,141,2,169,251,
     141,47'BNCH
1030 DATA 208,72,162,8,173,1,220,205,
     1,220,208,248,74,144,14,200,202,
     208'BMUI
1040 DATA 249,56,104,106,141,47,208,
     176,230,144,214,104,185,231,199,
     133,203,48'BSQK
1050 DATA 18,201,64,144,9,162,1,142,
     141,2,41,63,133,203,32,72,235,
     208'BJDJ
1060 DATA 53,168,201,255,240,21,197,
     197,240,44,133,197,185,0,199,72,
     41,127'BONL
1070 DATA 32,53,235,200,104,16,243,48,
     27,200,173,32,208,72,32,165,199,
     232'BNLM
1080 DATA 208,250,32,165,199,232,240,
     250,32,165,199,232,208,250,104,
     141,32,208'BSHO
1090 DATA 76,126,234,140,47,208,140,0,
     220,136,174,1,220,236,1,220,208,
     248'BNWO
1100 DATA 140,47,208,140,0,220,200,
     238,32,208,96,36,1,112,20,164,
     203,177'BMSG
1110 DATA 245,201,91,176,12,201,65,
     144,8,173,141,2,9,1,141,141,2,
     76'BHKG
1120 DATA 72,235,65,76,212,69,83,195,
     72,69,76,208,84,65,194,218,35,
     44'BJXI
1130 DATA 71,7,66,2,255,221,40,43,65,
     1,19,32,8,224,27,16,228,59,11,24,
     56'BMPJ
```

END

BY PAUL HIGGINBOTTOM

C Tutorial, Part 4

Get to know the C language in this series by programmer Paul Higginbottom.

At the end of the last article, I asked you to write a program with two functions: main( ), and power( ). Power( ) takes two integer arguments and returns the first number raised to the power of the second. The overall purpose of the program is to display the values 1 to 10 down the screen, raised to the powers 2 through 5 going across the screen. For example,

```
1   1   1    1    1
2   4   8    16   32
3   9   27   81   243
4   (etc.)
```

My solution below is not definitive. If yours differs from mine, that doesn't mean your program is wrong, better or worse. I believe the objective in writing programs is to keep them as simple as possible without using obscure tricks which are difficult for someone else (including you when you come to look at the program six months later) to understand.

```
main()
{
 extern long power();

 int i, j;

 for (i = 1; i < 11; ++i) {
  for (j = 1; j < 6; ++j) {
   /* power of 1 is i itself */
   printf("%7ld", power(i, j));
  }
  printf("\n");
 }
}

/*
 power() raises its first argument to the power
 of the second, and returns the result.
 note: this routine cannot handle negative or
 fractional powers.
*/
long power(base, exponent)
int base, exponent;
{
 long value;

 if (exponent < 1) {
  /* powers less than 1 go back as 1 */
  return(1L);
 }
 if (base < 2 || exponent == 1) {
  return((long)base); /* return as is */
 }
 for (value = 1; exponent > 0; --exponent) {
  value *= base;
 }
 return(value);
}
```

This needs some explanation. The first thing that's new is the use of the word "extern" in my program. This is used to inform the compiler of a variable or function that it would not have come across before you will use it in your program. In the previous article when the first was rewritten in two functions, I put the max function before main so that when it was used in main the compiler had already come across it and knew that it would return an int. In my program above, I have told the compiler that "power" returns a long.

You can use extern for variables which are to be used before they are defined, such as

```
main()
{
 extern int fred;

 printf("fred=%d\n", fred);
}

int fred = 5; /* here I am! */
```

By the way, I hope I don't offend people whose name is the same as those I often call variables. It has always been a habit of mine to give variables I have no specific name for an arbitrary one. Funny people, programmers!

Back to the first program. I could have lied to you about my solution and said that I just wrote it off the top of my head realizing that 10 to the power 5 (the largest number to be calculated and printed) is a number which cannot be held in an int (on my compiler anyway, under which they are 16 bits in size, which means the maximum unsigned value they can hold is 65535, and 10 to the power 5 is 100,000), but I didn't realize this until I had started writing this article!

So I used a long value instead (which on my compiler is 32 bits and can therefore hold an unsigned value of up to 4 billion) and all was OK, but if you had this problem, you would not have known how to print a long from reading my articles thus far. If you had this problem too, please accept my apologies. This is one weak aspect of C and most compiled languages—there can sometimes be machine dependencies, or even compiler whims, which make or break a program's integrity. Thanks to evolving standards for the C language, though, these problems should be ironed out in the next couple of years.

As you can see from the above, in the printf statement, you use %ld instead of %d in the format string to specify a long instead of an int. Whatever compiler you have should give reference to the various capabilities of its printf function in the manual.

Moving along, main( ) itself should be easy to follow—it's very much like the first program in this series of articles, except that it uses the power( ) function instead of a multiplication.

So the heart of this program is in our own new function power( ). Power( ) is defined as returning a long value. The saying that says that a function is only as good as its arguments sums it up well. Any function should be able to cope gracefully with argument values which are either meaningless or outside the scope of the function's capability.

Try to imagine what would happen if the first two "if" checks were not in this function and it was passed a negative power... can you say "hang" boys and girls?

My power( ) function cannot handle negative (reciprocated) or fractional (root) powers, but it tries to exit with the minimum of checking, even if the return value isn't always meaningful.

The first if statement is really meant to cope with an expo-

nent of 0, but was changed to < 1 rather than = = 0 to exit with negative powers. Any number raised to the power 0 equals 1, so that's what is returned. Note that the 1 in the return statement has an L beside it. This defines 1 as a long value because the function is supposed to return a long. Whole number constants are generally treated as int's by a compiler; adding the L tells the compiler you want it treated as a long. Adding a decimal part tells the compiler to treat it like a floating value (1.0).

Compilers should automatically convert the value being returned to the type of value the function is supposed to return, but it's good practice to do it yourself, then you won't ever be bitten by a weaker than average compiler.

The second if statement checks to see if the number being raised is less than 2 (1 to the power anything is 1). Again, this could have been "if (base = = 1)" but by being written this way, it can cope with more bad values without crashing. This second if also checks if the power is 1—if so, it will return the number being raised (any number raised to the power 1 is the number itself). Note how both checks can be accomplished in one if by using the logical OR operator.

Also note some new syntax here known as casting. The value base is an int, but the value to be returned should be long, so to tell the compiler this, you can specify the type to convert a value or variable to in parentheses. So "(long)base" means convert base's value into a long (this does not change base, though), and use the long value in this expression. This goes for all types, so if you wanted to convert a long into a character, for example, you would use

(char)somelongnumber;

This does have its pitfalls, though, because different types can hold different ranges of values. What if the number held in a variable of type long is too big to fit in a char? This depends on the compiler. In any case, if your program can get into this situation, it's not coded properly.

Having patted myself on the back for doing error checking, it's worth noting how poor this function is, too. It could do much more elaborate error checking, and return error values to indicate to the function that called power( ) what went wrong. Since the routine is supposed to handle numbers from 1 and up raised to powers 0 and up; this will yield numbers 1 and up. So returning 0, -1 or any other impossible values could tell the caller that the arguments were bad.

I didn't put in all this checking, because I didn't want to have a whole page of code for such a simple function, but I wanted to mention the problems you will run into in trying to make robust programs that can cope with "garbage in." Which brings me to Higginbottom's first law of programming: 95% of the code in any program will be to cope with situations other than those for which the program was intended!

Examples of such other situations are argument error checking, hardware failure, software failure, user help, endless loop checking and operating system bugs.

Now it's time to look at another type of flow control besides do-while's, if-else's and while's.

The Switch Statement

This is a nice way of handling the situation when a variable must be checked for a variety of different values. Let's suppose a key is pressed by the user in a word processor, and the program must decide what to do with it. Skipping the details of how the keypress will end up in the variable and the functions used, this can be accomplished by

```
  /* by now the user's keypress is in the
     character variable 'c' */
switch(c) {
  /* branch depending on what they typed */
  case '\b': /* backspace */
   DoBackSpace();
   break;
  case '\t': /* tab */
   TabAcross();
   break;
  case '\n': /* return key (newline) */
   NextLine();
   break;
  case 27: /* that's the escape key which means
              help to us */
   Help();
   break;
  default:
   Insert(c); /* by default, the key gets put
                 in the document */
   break;
 }
```

Each case statement handles when the value of the variable in the switch statement equals the constant specified. The variable in this instance is a character, and character constants can be literally specified between single quotes (including the recognized meta-sequences prefixed by a backslash or a value, because chars and ints can generally be freely intermixed in C programs.

The default case is executed if no case matches the value of the variable in the switch. Note the break statement after each case's statement(s). When these are reached, program execution breaks out of the switch statement block (enclosed by braces) and continues after it.

If the break statement is omitted in any given case, the program will continue in the case (or default) below it. From this, you may realize that the default case really doesn't need a break statement. It is there for consistency.

Note also that in each case more than one statement can be executed (although only one is executed in each of the cases in the above example), but they do not have to be enclosed by braces. The colon after the case identifies the start of the block, and the compiler knows that the code for that case continues from that point forward.

For reference, the usually recognized special character constants are

```
\b - backspace/ascii 8.
\t - tab/ascii 9.
\n - newline/linefeed/ascii 10.
\f - formfeed/ascii 12.
\r - return/ascii 13.
\0 - nul/ascii 0.
\e - escape/ascii 27 (rare).
\0xx - specify ascii value as 2 digit
       octal number (xx).
\xyy - specify ascii value as 2 digit
       hexadecimal number (yy) (rare).
```

Since single and double quotes delimit character and string constants respectively, they can only be specified within a character or string constant by prefixing the backslash.

```
'\'' /* single quote character constant */
"the last word is in double \"quotes.\""
```

by Dan Gutman

Saturday Night Software

PROGRAMS TO PARTY BY

Who says your Commodore 64 or Amiga can't be the life of the party?

My wife doesn't know anything about computers. She thinks an Amiga "has something to do with that Steve Martin movie." She has a special name she calls Quantum-Link, CompuServe, Genie and the other on-line telecommunication services I subscribe to—"The Nerd Network."

Imagine my surprise when we went to a party not too long ago and I found her glued to the screen for three hours. The host, who happened to be a "computer friend" of mine, was running one of those simple personality test programs—you answer a bunch of questions about yourself and the computer analyzes the data to give you an evaluation of your personality.

You see, my wife doesn't know anything about computers, but she loves taking personality tests. Like many people, she assumed that computers can only do boring things like word processing and financial number crunching. The party was a revelation to her. And to me, as well. I saw that it was a great new way for a group of people to have fun with computers.

Usually, the mere mention of computers at a party will start guests thinking of reasons to go home early. But instead of *talking* about computers, turn one on. You'll find that partygoers have a strange attraction to the glow of a monitor screen—something akin to moths buzzing around a bare bulb on the porch in July. In any case, a computer can really liven up your next party.

However, unless your friends are all hackers, you'll have to do more than just turn the computer on at your party. Just as you carefully decide who to invite and what to serve, picking the right party software can mean the difference between a terrific evening and a crashing bore. Here are a few rules.

Rule #1 Nuclear Holocaust Parties Can Be a Downer

Surprisingly, computer games don't always make the best party programs. People come to parties to relax, not to compete against their friends or feel the stress of defending civilization against The Undead Kobolds. It's no fun for beginners to play a game when there are people peering over their shoulder and making derogatory comments about their playing ability.

Games also tend to tie up the computer for long periods of time. The more experienced players usually end up hogging the keyboard all night and showing off how good they are. In a worst-case scenario, you could have a couple of jerks come over your house, start playing *Zork*, and three months after the party they're still in your living room staring glassy-eyed at the screen and eating your Cheese Doodles™

If you're stuck on games, go for games that can be played quickly, so everybody can get a chance to try them out. Shoot-'em-ups are good and fast, but some people will be intimidated by them. Gambling simulations are particularly good because they can be stopped and started with any roll of the dice (or deal of the cards, or spin of the wheel). Also, they usually rely more on luck than skill. Nobody has to feel like they played poorly, even if they lose.

One thing you'll want to stay away from at a party are "downer" games. Mindscape's *Balance of Power* is a great program, but world-wide nuclear holocaust is a sure way to put a damper on anybody's evening.

BOB EMMOTT



Rule #2 Computers Play Just as Well as Mookie Wilson

One thing you might want to try is a sports simulation party. Before this year's World Series, pick up a copy of Epyx's *The World's Greatest Baseball Game* (Commodore 64), Avalon Hill's *Computer Statis Pro Baseball* (Commodore 64), or Strategic Simulations' *Computer Baseball* (Commodore 64). These programs contain the actual statistics of every major league ball player. So while the real teams are batting it out on your TV screen, you can run a simulation of the same game on your computer screen.

You can do the same thing with the Super Bowl (Strategic Simulations' *Computer Quarterback* for the Commodore 64) or a big boxing match (Sierra On-Line's *Championship Boxing* for the Commodore 64).

During last year's World Series, I matched up the Red Sox and the Mets with *The World's Greatest Baseball Game*. It made the Series twice as much fun for me and my friends to compare the simulation and the actual game. (The computer must know what it's talking about—my computerized Mets beat the Sox, just like the real Mets did.).

Rule #3 Call the Cops Before Berserk Psychologists Wreck Your House

One of the best party programs out there is Mindscape's *Racter* (Amiga). It doesn't process words, run your business, or sort your supermarket coupons. It simply has a chat with you. For example,

Me: I'm hungry.

Racter: Gulping champagne is Benton's love. Chewing lamb is Benton's passion. Anyway, Ms. Otter suddenly sees only cucumbers.

Okay, so it's not exactly deep thought, but it is a conversation. You may have noticed that Racter is an idiot, but he's not a *complete* idiot. I brought up the topic of hunger, and he talked about food. That takes some amount of intelligence, artificial or otherwise. That's what makes Racter so entertaining. He follows the thread of your conversation, but he doesn't make a lick of sense.



Put *Racter* up and running at your party, and it won't be long before a line of people forms waiting to have a chat with him. The program is always good for a few laughs, especially when you've had one too many.

Another great conversation program is Artificial Intelligence Research Group's *Eliza* (Commodore 64), the computerized shrink. You type in your problems and Eliza sends back appropriate but totally worthless psycho-babble. Eliza is even dumber than Racter, as her responses are canned while his are more random.

Because we humans love to find out about ourselves, psychological programs are great for parties. Just put a personality analyzer or other quiz up on the computer and watch your friends drop their drinks and flock to the screen. If your guests are serious business people, try Human Edge's *Mind Prober* (Commodore 64), which claims to "read the minds" of people you've just met. Mindscape's *The Luscher Profile* (Commodore 64) is a very good five-minute test that evaluates personality



baseu on color preferences. Bantam's *Know Your Own Personality* (Commodore 64) will also attract a crowd to the keyboard.

And Merrill Ward's *How to Succeed with Love & Money* (Commodore 64) is sure to entertain as guests discover if they are good lovers, if they think like millionaires, if they see themselves as others do, if they are psychic, who their perfect mates are, and what the contents of their pockets, purses or closets reveal about them.

But don't forget, of course, that frequently you can find interesting public domain psycho-oddball-software that is very cheap and not sold by major software companies.

Incidentally, if you have any friends who are professional psychologists, they're sure to claim that all these programs are frauds. This usually creates terrific heated discussions, which always makes a memorable party experience. If fists start flying, call the police before they wreck your house.

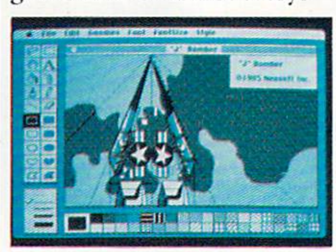
If your guests are a little more laid back, they'll usually get a big kick out of charting their horoscope or biorhythms on a computer. Astrolabe and Zephyr Services both make a wide assortment of these programs, which can usually do their calculations and print out the results in a few minutes. And of course, don't forget Commodore's own *Micro Astrologer* (Commodore 64) to chart those horoscopes.

And if your friends are *truly* laid back, see if they can handle IntraCorp's *Intracourse* (Commodore 64). The computer asks you 100 multiple-choice questions about your sex life (many of which will provoke gales of laughter). Then it prints out an evaluation of your sexual profile (which your friends may find even funnier).

IntraCorp even recommends bringing the program to a party to see which members of the group are most compatible. If *that* doesn't liven up a dull party, turn off the computer and send everybody home. You're just not the party-throwing type.

Rule #4 If the Party Starts to Drag, Turn on Your Printer

The recent desktop publishing craze is more than just printing up home-made newsletters. It's also a great way to spice up a party. Now you can use the computer to give your guests their own model toys



(Broderbund's *The Toy Shop* for the Commodore 64), paper airplanes (Simon & Schuster's *The Great International Paper Airplane Construction Set* for the Commodore 64), T-shirts (Diversions' *Underware Colorpak* for the Commodore 64), or certificates (Spring-

board's *Certificate Maker* for the Commodore 64).

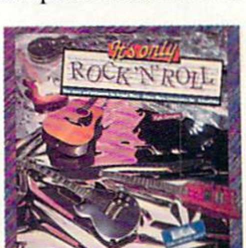
One of the 220 awards in *Certificate Maker,* in fact, is their Party Animal certificate. (You can also show your friends you care with a Foot in the Mouth Award, Big Mouth Award, or the ever-popular Bad Haircut Award.)

Now you can throw a party and give your guests something they can hold in their hands and take home with them. You'll be amazed how people will treasure just about anything with their own name printed on it. It's like they'd never seen a T-shirt or paper airplane before. Make sure you have plenty of paper.

Rule #5 Boot Up Idiot-Proof Programs

You don't have to have artie friends to harness the creative power of computers. You don't even have to have friends *named* Artie. Slap on just about any good graphics program and watch the sparks fly. Most people will be tempted to grab a joystick or mouse and draw pictures on the screen. It's also fun to hook up a digitizer such as Digital Vision's ComputerEyes (Commodore 64 plus a video camera) and shoot digital pictures of your guests. Once your best friend's mug is on-screen, you can draw a moustache on him or shave off all his hair, which is always fun.

Computer music can also



be interesting, unless the party is loud and the stereo drowns out the computer. Electronic Arts' *Instant Music* and *It's Only Rock And Roll* (Amiga) are probably the best music programs for parties, because they make anyone sound good. The program is essentially a template of musical styles and it "screens out" any notes that would sound bad. You can hit any key on the computer, but the program only allows notes to get through that fit in with the rhythm section. So somebody who doesn't know how to read, write or play music can "jam" with the computer and sound respectable.

Rule #6 Let Kids Do the Grunt Work

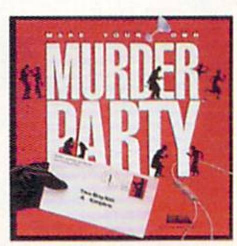
Forget about bobbing for apples and Pin the Tail on the Donkey. That's old news. The hip kids of the late '80s want their parties high-tech. That's good news for you. In the past, the kids got to have fun while the adults were forced to do all the grunt work. Now, thanks to the computer, you can sit back and relax while the kids plan their own parties.



High-Tech Expressions' *PartyWare* (Commodore 64) is a soup-to-nuts party processor. This one program will print out invitations, banners, party hats, place mats, place cards, a party planning checklist, party games, prize ribbons and thank you notes. It also includes a data base for names, nicknames, addresses, phone numbers, birthdays and special events for up to 60 young party-goers. Talk about integrated software! *PartyWare* does everything but clean up the mess afterward.

Rule #7 Don't Leave Dead Bodies Around Your Livingroom

Usually, when someone is killed in your house, it doesn't make for an enjoyable evening. But there are exceptions. Electronic Arts' *Murder Party* (Commodore 64) lets you host an evening of murder entertainment for six to eight people. It's not a game you play on the computer, but the computer generates all the materials you need— invitations, instructions, scenarios and clues.



When all your guests have arrived, they'll discover that someone has been "killed." Anyone could be the murderer. Even you won't know whodunnit until the end (unless you cheat and look at everyone's clues). Each partygoer gets a personalized clue booklet. Inside are police evidence and information about where they were at a certain time and what they saw or overheard. You don't want to tell the other players what you know, but you have to tell the truth if they question you directly.

One of the scenarios on the disk is a takeoff on *The Big Chill* (called The Big Kill). Your old college gang is getting together at the funeral of your friend Jeremy Summers, who committed suicide. Jeremy was a popular actor in shlock TV shows like *Meat for Hire.* As it turns out, Jeremy didn't kill himself—he was murdered.

You may be any of the characters, such as Teddy the ex-hippie ("Sure it was fun hanging out with the boys on Hippie Hill, but another year like this and Teddy would end up just another drooler in the Haight hawking plastic love beads to Joe and Mary Sixpack in from Indiana for the tuna festival.").

As often happens with close friends, every one of the group has a motive for killing Jeremy. I won't give away any of the possible endings here. Needless to say, it's always fun finding out which one of you is the murderer. And it sure beats standing around all night with a drink in your hand reading somebody's album covers.

Rule #8 Avoid the Pepsi™ Syndrome

Here are a few tips to keep in mind when introducing the computer to your parties.

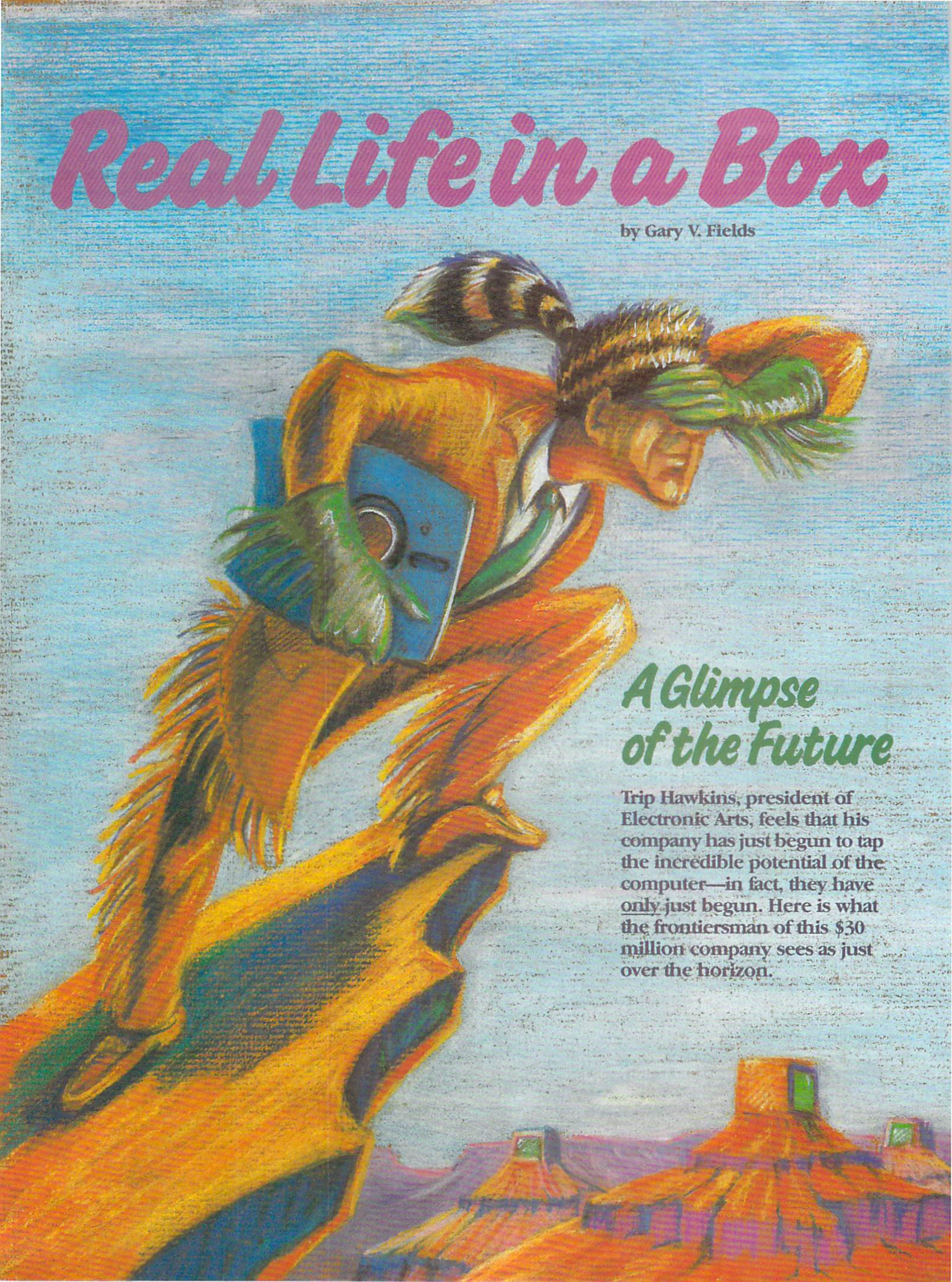
Don't tell your guests that you're inviting them to a computer party unless you plan to check their plastic pen holders at the door. Your non-computer friends will stay away in droves. Don't even mention computers when you invite people to your party.

Don't push it. For most peo-

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Real Life in a Box

by Gary V. Fields



A Glimpse of the Future

Trip Hawkins, president of Electronic Arts, feels that his company has just begun to tap the incredible potential of the computer—in fact, they have only just begun. Here is what the frontiersman of this $30 million company sees as just over the horizon.

In San Mateo, California, there is a Mercedes coupe sporting an unusual license plate which reads GAMEBUF. The executive behind the wheel is Trip Hawkins, and his story and his company are unique in the history of computers. But don't let the GAMEBUF label fool you—enjoying computer games is but one minor facet of this man's makeup.

Hawkins, at age 33, is founder and president of Electronic Arts, a major software developer and distributor for the home computer market. In five years, Electronic Arts has evolved from a small garage-size enterprise into an international company. Hawkins' reasons for success make more than good reading—they are good advice.

When I was offered the chance to interview Hawkins, I expected to have to spend a lot of time weeding the information interesting to our readers from the traditional promotional pitch. I was wrong. Hawkins' interest far transcends business and profits—his words reveal a sincere concern for people and a desire to make it easier for them to interact with computers, as well as a pioneer-like enthusiasm for future technology. From his vantage point, he sees an adventure ahead for all personal computer owners. In fact, selling software seems to be a secondary concern for Hawkins.

Hawkins likens himself to a pioneer in a three-piece suit exploring twentieth-century frontiers. And like all of history's pioneers, he is excited about the newly opened territory. Almost reluctantly he will talk about the past, but ask him to see into the future and a smile crosses his face. Like a true frontiersman, he sees the future waiting just around the next curve in the river or over the next mountain ridge.

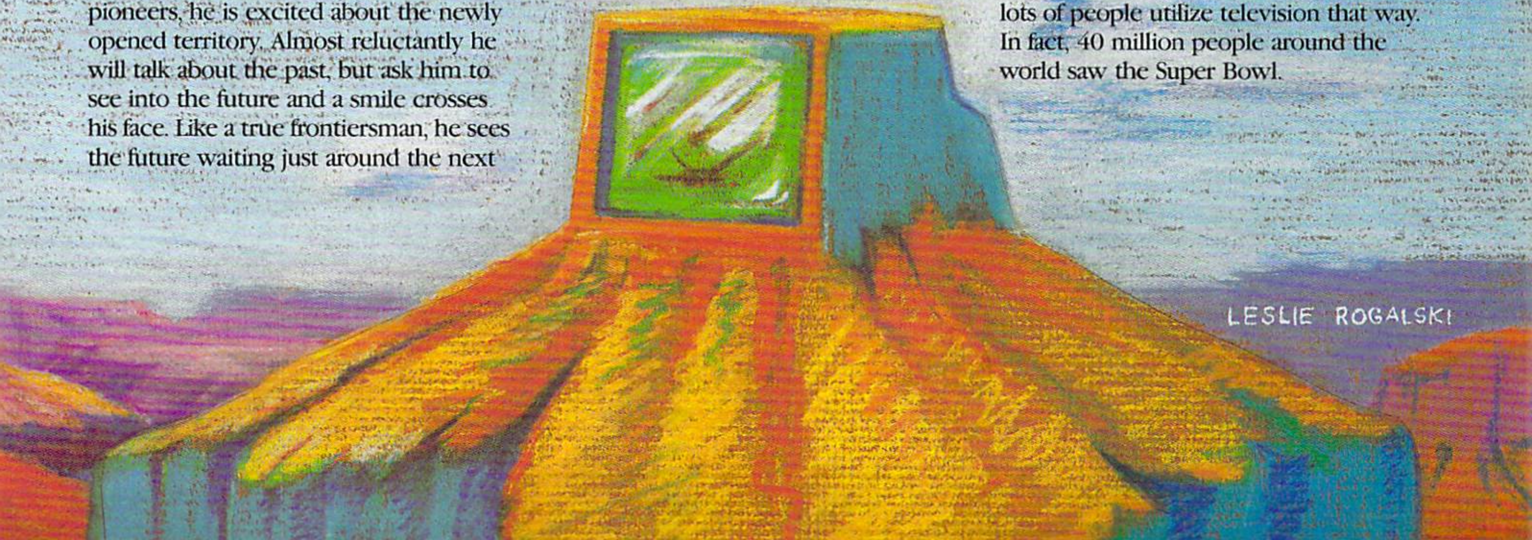
Electronic Arts was founded in 1982. In Hawkins' words, "I got some people together in August of 1982 and we brought our first product to market on May 18, 1983. We had about 30 employees at that time and we all went down to the warehouse and packed up our first orders and shipped them out. That was a lot of fun." Since then, Electronic Arts has grown into what Hawkins says is the largest publisher of home computer software in the world. In fact, while much of the industry was trying to hold on to a little piece of the pie, Electronic Arts was busy expanding into the British, English and Japanese markets.

"I think of myself as a pioneer because I got in when the industry began," says Hawkins. "I was interested in the use of computers for entertainment and education well before the micro-processor was even invented. I structured my college degree around the use of computers in these applications. It was a sort of unusual thing to do at Harvard at the time, but I created a special field of concentration called 'strategy in applied game theory.' It took me a while to convince the administration that it was a legitimate academic degree. And in fact, in the end they made me do enough work to get degrees in two other normal departments before awarding the degree I wanted.

"Part of what I did there was a senior thesis on organizations and control of organizations. That has always been a strong interest of mine so I kind of view Electronic Arts as a continuing laboratory in which to conduct organizational experiments. Part of that thesis project was a computer simulation of a nuclear arms conflict which was used to demonstrate nuclear arms control problems. I ended up putting some guys from the Pentagon through the simulation, which was a lot of fun. So you could say I've been with computers from the very start."

His enthusiasm for computers and the difference they can make in human life has never wavered. He sees new technology as capable of healing the country's woes—and in other cases, inflicting them.

Hawkins explains, "Our philosophy about software development is that we think the home computer is a new medium—an electronic medium. It's different from television, high fidelity or video. What makes it different is that it is possible to interact with a computer. One thing that all electronic medium have in common is that in essence they put real life in a box. If you watch television you can see what's going on in the world without really being there. It's like a window where you can go anywhere in the universe and anywhere in time and you can see what's going on. So obviously lots of people utilize television that way. In fact, 40 million people around the world saw the Super Bowl.

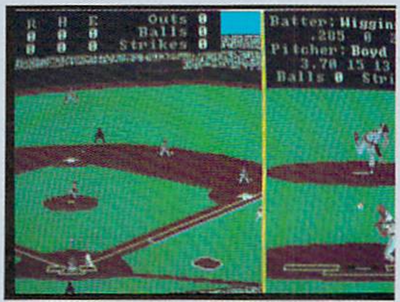


"That's an incredibly powerful thing that only an electronic medium can do—give people access to more of what the human experience is all about. But one of the problems with the existing mediums is that they are all passive—you look at them or listen to them. But there is a limit to how much brain activity and active involvement you can have with them. That's where the computers come in. In the past, the computer has been a business tool and it hasn't had the audio-visual technology and sophistication to keep up with the other media in the home. In terms of the ability to put real life in a box, it has been too abstract.

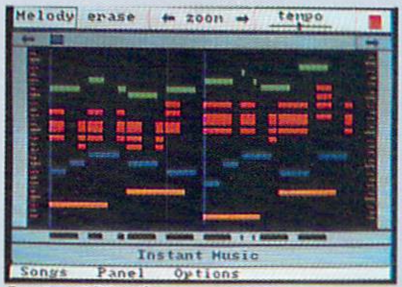
"Now what's happening is the technology is continuing to get more audio-visual. With the Amiga and the Apple IIGS, the hardware companies have finally realized that's the direction we have to go. With time, computers will be able to keep up with other media like television. Yet you will have that incredibly important distinction which make them unique. A computer is an interactive medium.

"One benefit derived from this interaction is that the human brain actually physically increases its size. It has been proven that interactive exercise is the single best way to increase your intelligence. Everyone knows you learn by doing. The computer supplies that opportunity. You put a different disk in your computer and you can be flying an airplane, commanding a submarine, competing as the manager of a professional baseball team, discovering the New World as Christopher Columbus, or executing a slam dunk as Doctor J. You can be anywhere you want and anyone you want. As your brain is switched on, you increase your intelligence.

"This technology has the potential to do more for learning and education than anything that has ever existed. It will have the same revolutionary effect on human intelligence that the original invention of moveable type had back in the 1400's. I think that the Gutenberg printing press was one of the major factors which stimulated the Renaissance—that huge burst in human creativity and technology advancement. The computer is going to have the same kind of effect in our time."



Earl Weaver Baseball



Instant Music



Deluxe Paint II

"Everyone knows you learn by doing. The computer supplies that opportunity."

Using his home state as an example, Hawkins explains, "In California, which is considered very advanced, the average student has access to a computer only 20 minutes a week. Compare that to television, a similar costing technology, which your average student has access to several hours a day.

"Let's look at the effect of that. In America, 11% of our adults are considered to be functionally illiterate. That's a big number; that's millions and millions of people. Not only that, but statistics have shown that U.S. students' math scores are lower than any other non-Third World country. What this suggests is that our over-reliance on television has really hurt the advancement of the intelligence of the American people. Because we are the most advanced country and we have the most usage of television, we are suffering the most.

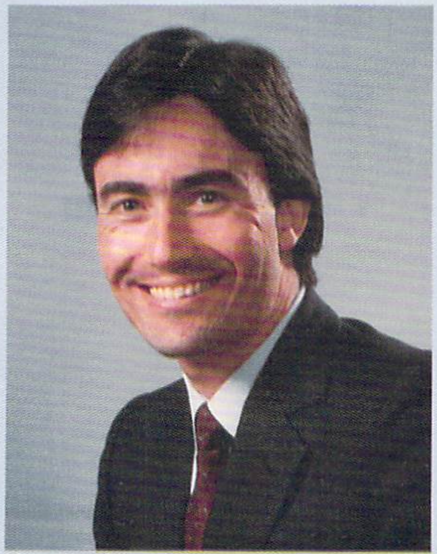
"But we can be the first people to heavily utilize the computer, so we can also be the first to reverse that trend. We can show the rest of the world what computers are capable of accomplishing. That's what Electronic Arts is trying to do—make the software which will make home computers worth owning. We want to develop the technology which can really help people increase their intelligence.

"We look at the computer as a vital tool for mental fitness. If you think about it, a hundred years ago everybody was a farmer and so everybody was physically fit and they didn't have to think a lot. They just had to go out and do their farming. Then we went through the Industrial Revolution and everybody became factory workers, but they were still in a physical job which didn't require as much intelligence.

"But since the first half of the twentieth century, 1950 to the present, the vast majority of the work force are now in office jobs. There, instead of using their physical strength, they have to use their mental strength. As a result, in the last 20 years people have begun noticing that they are not physically fit, which has stimulated the physical fitness movement. But this time around people found ways to make physical fitness entertaining. That's what it takes to motivate people to do something—they have to be entertained. So physical fitness has become a big thing because it's fun, social and is good for you. It makes people more attractive and increases their life span.

"But people working in offices are dependent upon their brain. Their success, career and income are dependent on how intelligent they are and how they apply that intelligence. So people need mental fitness much more than they need physical fitness. We think the home computer can be the key technology to stimulate people's mental fitness."

Hawkins is the first to admit that Electronic Arts doesn't have a monopoly on the software world, creative people or ideas. In fact, most of the company's products are produced by freelance programmers. For example, one of their first products, a program called *Hard Hat Mack*, was born after two teenagers approached Hawkins with some ideas sketched on notebook paper. After a discussion, a deal was made and the boys



Trip Hawkins

received a five figure advance. Six months later, the program was on the market and eventually sold 60,000 units.

How does Hawkins know if a project will be successful or not? "Sometimes you can see a glitter in the person's eye. We are looking for the people with the best ideas, which also have commercial potential. After all, this is a business. To be successful you must have the right ideas and the technical ability as well as the conviction and determination to finish. That's the hardest thing about software—knowing when it's finished."

He prefers to call programmers "artists" and has advice to all that aspire to fame and fortune. "If anybody has an idea for a great product, we want to hear about it. Several people have done just that and gotten small fortunes from the royalties. They should attempt to sell their programs just like a book author sells his manuscript—if a publisher turns down their product the first round, they should listen to the company's criticism and make it better and then try again.

"You have to have the confidence to step forward and tell publishers about your ideas and programs. But to be successful, artists need to expand their awareness of the electronic entertainment media by reading and going to the movies. I think if you are going to be a creative person and create software, then you have to be well read and be up to speed on what's going on in the culture as well as be a real student of all the electronic media. Be prepared to work hard, set aggressive goals, then go after them. That takes discipline. There is always room for people with ability, good ideas and a willingness to work hard.

"It appears the population has divided itself into three groups: one group ignores computers, one group uses computers, and one group uses and programs computers." In the future, Haw-



The Bard's Tale

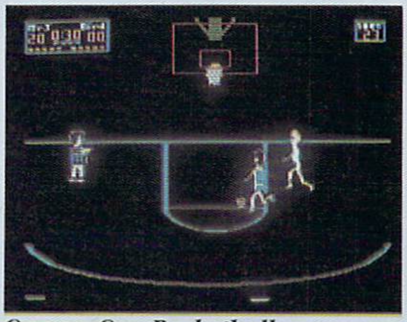
kins sees the technological line dividing the latter two groups dissolving. "In the future, ideas will be as important as technical abilities. And the new generation of computers and software will make them manageable by anyone interested.

"Until now, successful programmers had to be more than creative —they had to be technicians capable of creating in machine language (the computer's native language of numbers)." With bigger, more powerful, yet friendlier machines like the Amiga, Hawkins sees a change in that rule. Just as authors don't need to know how to set type and musicians need not know how to assemble an instrument, the future will free artists who know little or nothing about how code is assembled to professionally program a computer.

"In the future," said Hawkins, "I think technology will make it easier for creative people to pull the levers to create software without having to be the mechanics and tinkers of the technology. Up until now, software was developed by people who really knew the computer inside and out. In the future, I think the artists will be able to concentrate on their creations instead of mastering the hardware which makes them possible.

"A good example of this is *Earl Weaver Baseball*. Earl Weaver is a great guy for designing the best kind of baseball program, but he didn't know how to program a computer. As time goes by, the people who know about the human experience will be able to simulate on a computer without having to master the technology of the medium.

"In our publishing group, we have tried to be a magnet which attracts the best creative people and best ideas from anywhere in the world. We don't think we are smart enough to know what the next great idea is going to be, but we think that someone out there has got it. We want to be a place where they can come and we can help them make it even better and show them how to do



One-on-One Basketball

things they don't know how and then get it to the marketplace efficiently. And we want to give the kind of recognition and reward they deserve. A software artist really wants the independence, creative freedom, recognition and reward. So we have geared our company to give them those."

Hawkins thinks the company's success is linked to three philosophies that set Electronic Arts apart. First is that, "We both publish and distribute software. We've always believed that we could learn the most about our customers and help the retailers if we sell to them directly. This way we have the opportunity to get to know them and appreciate their needs. That helps us do a better job and develop better products.

"Second, people want quality. We try to give it to them. To be blunt, lots of the companies which haven't had success haven't really had respect for the customer. A lot of them thought this industry was a great place to make money. They thought you just had to package some products and if you had a better ad campaign, then you would win. Well, the customers are much smarter than that. The people who own computers are very sophisticated about what a good product should be like. So they rejected products which weren't good enough and in the process rejected the companies behind them. Since we began selling products, we've won 20% of all the awards given for home computer software quality.

"And third, hard work. The harder I work, the luckier I get."

Regardless of how hard they work, every producer of software has a few pro-

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WAN

CARVER GANG

PART ONE

the War Game Years

by JOHN JERMAINE

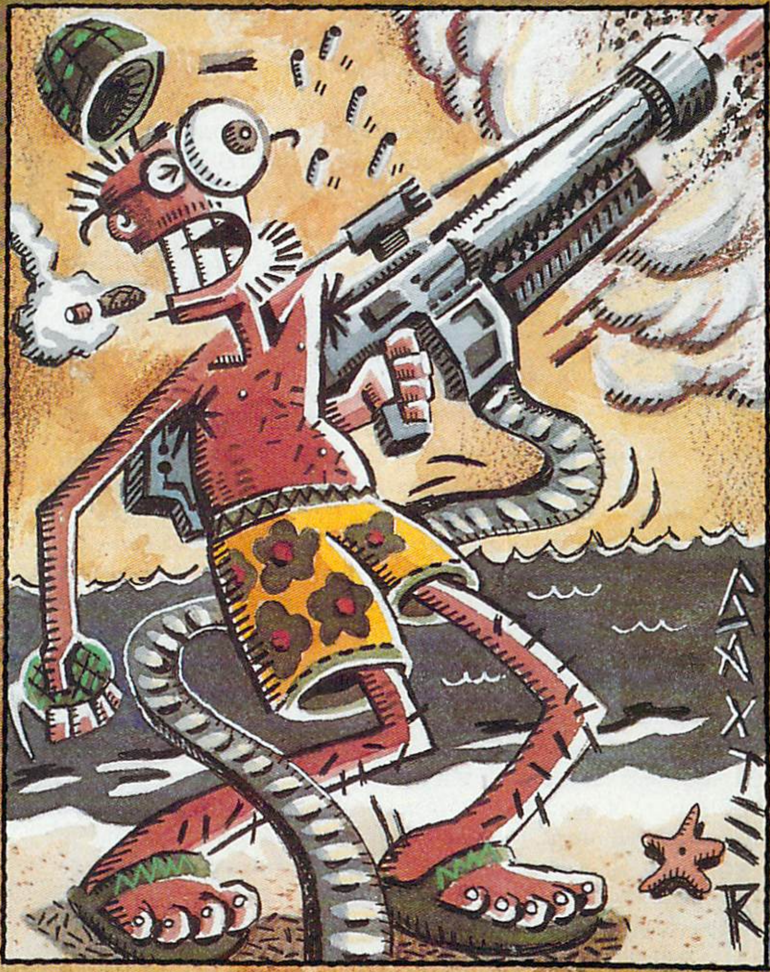
From their secret hideout somewhere near Salt Lake City, the Carver brothers, creators of such hits as *Beach Head, Leader Board* and *10th Frame,* continue to plot against the 64 game-playing community. Here we look at how these modern-day desperados got their start stealing the hearts of game players.



BRUCE CARVER: During Moscow Raid

I recently interviewed Bruce and Roger Carver to learn the secrets of their success. The story is in two parts. The first part examines the origin of their company, Access Software, and discusses their programs through the completion of *Beach Head II.* The second part explains what actually goes on inside your computer while you're playing *Leader Board* or *10th Frame,* how you take a video tape of a golfer or bowler and translate it into computer graphics, and other tricks of the trade.

TED STILL AT LARGE



ROGER CARVER: at the Beach Head

The story begins with Bruce Carver. He's 38 years old, holds a Bachelor of Science degree from Idaho State University, and has a talent for manipulating mathematics.

Jermaine: How did you get interested in writing home computer software?

B. Carver: While I was in college, I took a Fortran class. It seemed innocent enough at the time, but that little course introduced me to computer languages. That experience would also come back to haunt me several years later.

Once I'd finished my education, I began designing railroad car refrigeration equipment for the Pacific Fruit Express Company. By August of 1975, I had left them and moved on to Redd & Associates, a local engineering firm in Salt Lake City. By the summer of 1982, I had completed my eighth year of working for the firm. My boss had just purchased a 16-bit custom-designed computer for the company and he needed somebody to operate it. He knew I had taken a Fortran course in college, so guess who he approached with the job?

To make matters worse, I would have to learn assembly language immediately before I could use the machine. The final shock hit when I discovered that no one else in the office knew anything about computers. This phase of our work would be totally my responsibility.

I decided to purchase a home computer for my study of assembly language. Steve Witzel sold me my first Commodore 64. We became close friends and went on to co-found Multibotics, Inc. In the meantime, I learned assembly language on my own, but I found myself becoming more and more interested in the capabilities

ART BAXTER

Jermaine: Did that lead to the founding of Access Software?

B. Carver: Yes. I didn't know how other companies selected their names, so I assembled together a group of my friends for the task. We searched through dictionaries and encyclopedias looking for the perfect title. Our little group finally came up with three possibilities: Action Software, Center Soft and Access. Everyone liked the name Access best, so I checked to see if anyone else was using the name. The rest is history. Access was incorporated the first day of November, 1982, just four months after I had purchased my 64.

It might interest you to know that my first six month start-up budget was approximately $25,000. Today that same venture would probably cost closer to $50,000. We've also built up a reputation over the years. In order for a new company to penetrate the current market and obtain a share of the sales equivalent to that of Access, they would have to invest another half a million dollars, in addition to having a high-quality line of software. That's easier said than done today.

Jermaine: What is the story behind the creation of *Sprite Master?*

B. Carver: If you have read the 64 user manual, you will discover that it doesn't mention multicolored sprites at all. In fact, it originally didn't tell you where the joystick ports were.

During the later part of 1982, I began an experiment trying to create multicolored sprites on the 64. I finally located the video chip after a long systematic search and began playing with the registers to see what visual effects could be generated. Then it was just a short period of time before I came across a way to produce multicolored sprites. *Sprite Master* was one of the first 64 sprite editors on the market. It was also designed to be an animating tool that allows the user to change the size of objects very rapidly on the screen.

In December of 1982, I decided to attend a small Commodore dealer show in San Francisco. It was the perfect stage to introduce my new program to the public. The Commodore representative who was running the show came over and asked me if that was multicolored sprites I was displaying on the screen. I replied yes it was. He was so impressed with my work that he offered me a xerox of a Commodore folder containing 64 technical information. He also warned me not to tell anyone else that I had it. So I returned home with a valuable prize that would save me many long hours of playing around with the computer.

Jermaine: How did you develop *Neutral Zone,* your first game?

B. Carver: *Neutral Zone* evolved from an experiment containing high-resolution character graphics and scrolling. I was still learning about the machine, but Commodore had supplied me some food for thought. It was interesting to learn that the computer actually had 64K of RAM and that you would get to the ROM by flipping it over. The *Programmer's Reference Guide* hadn't been released yet and information concerning how the computer worked internally was simply non-existent.

As I continued to play with the horizontal scroll, I constructed a star field to see how it looked. Satisfied with the effect, I started adding other features including space ships and the ability to fire. My programming fantasy was now beginning to resemble a game. To complete the program, I added a scoring mechanism, made it possible to shoot your foe and to be shot yourself.

Shortly after I had finished the game, I went to another Commodore dealer show in Florida. As I was demonstrating *Neutral Zone,* a Commodore executive approached me and examined my work. I remember him being quite pleased and saying he knew someone would make the 64 do a lot more than we were currently seeing on the software market. Yes, you guessed it. This was the same gentleman who had given me the technical data in San Francisco. He apparently didn't recognize me. By today's standards, *Neutral Zone* isn't a terrific game, but at the time it was state-of-the-art in terms of the technology used to create it.

Jermaine: *Beach Head* was your second game. Was it easier to program than your earlier projects?

B. Carver: Yes it was. *Beach Head* was a real game from the very beginning. It was planned in depth ahead of time, before I actually did any programming. Chris Jones, my accountant, showed an interest in my work. We're both old war movie fans, so I suggested we put our heads together and design an action war game. *Beach Head* was the perfect outlet for our imaginations. It allowed us to take our favorite film scenes, translate them to computer graphics, and actually participate in the action. Chris has continued to work with me through the years, providing interesting ideas and an extra opinion when it comes to setting the difficulty level of a challenge. Even though Chris isn't a programmer, his influence is present in all of our games.

Getting back to *Beach Head,* I had this picture in my mind of the player shooting down enemy aircraft from a ship. Once I had thought out the anti-aircraft gun idea, everything else revolved around that central theme. As far as I know, *Beach Head* was also the first piece of 64 software to contain five independent games within one program.

Looking back, there was one flaw in the way I put the program together. The player had to complete phase one to advance to phase two and so forth. By doing things in this manner, many of our customers never got to participate in our final challenges. We corrected this oversight when Roger wrote *Beach Head II.* He created a system where the player had to compete in each segment of the game in order to complete the round and receive a final scoring for the game.

This is the story we came up with to support what was happening on the screen: An evil dictator has taken control of your island homeland. You are returning home with an armada to defeat this fanatic, and restore freedom to the land. The first challenge has the player maneuvering ships through a narrow hidden cavern patrolled by special torpedos. Once you complete this task, the game commander shoots down enemy aircraft, destroys the dictator's navy, brings tanks ashore to crush the island defenses, and finally attacks the enemy fortress. This was the way we envisioned the game, and these ideas survived in the finished product.

Beach Head was created during the final half of 1983. We did well during these months, but Access was still in its infancy. In fact, I was doing all of the work on *Beach Head* in my own basement. This was the time when we seriously started observing the world software market. I wanted our future games to be just as attractive abroad as they were here.

"From this ton of raw ideas, only about 5% of them will be used in the program we're working on."

Jermaine: Where did you get the idea for *Raid Over Moscow?*

B. Carver: *Raid Over Moscow* has the distinction of receiving its title before we actually had any plans for the game. In January of 1984, we attended the Consumer Electronics Show in Las Vegas. The dealers reacted favorably to our first three products, so I considered the trip a success.

On the way home in the back of a van, *Raid Over Moscow* was born. I was talking with some friends and we started discussing interesting ideas for possible future games. Someone came up with the phrase *Raid Over Moscow* and the van went silent. Once we arrived home, I decided to develop such a project. But first of all, Russia was in hot water with most of the nations around the globe. They had invaded Afghanistan, their air force had shot down an unarmed Korean airliner, and Washington wasn't very pleased with them for boycotting the Olympics. We might offend the Soviets with our new project, but most people wouldn't care.

A second issue came to mind. Americans had launched an anti-Russian campaign of their own. I don't believe that the Soviets are totally honest with the rest of the world. If all of our American customers felt the same way, as I was sure they did, *Raid Over Moscow* had the potential of becoming one of the classic Commodore games of all time.

There were also some negative aspects to my thinking. Some Americans were crusading against nuclear weapons, atomic power and the arms race. Would they be offended by *Raid Over Moscow?* I also wondered if the European market was ready for a product of this nature. Russia is literally in their backyard, and the English are particularly touchy when it comes to talking about the possibility of nuclear war.

In the end, *Raid Over Moscow* sold well, but not as well as *Beach Head.* Some of our people think we picked the wrong subject to work with, but 1984 was also a bad year for home computers and software in general. During February of that same year, we moved into our first building. It gave us approximately 1,500 square feet of floor space to work with. Today, two moves later, we have a facility with 6,000 square feet and we're still bulging at the seams.

Bruce's brother Roger now enters the picture. Roger is 33-years old, an excellent golfer, a decent bowler—but confesses that he isn't much of a video game player. Considering the outstanding golf and bowling simulations he helped create, this is quite a confession.

Jermaine: Roger, how did you enter the world of game programming?

R. Carver: I had been in the Navy for nine years working with mainframe flight simulators. Everything was going along just fine until the Navy decided to do away with my rate. This meant that I would have to change over to another rate, and I wasn't very pleased with the situation at all.

During the fall of 1983, I went home on leave. Bruce and I spent a lot of time discussing the home computer market and the way the software market was taking off. In the end, I decided to buy a complete Commodore package including the computer, disk drive and monitor. I already knew machine language from my mainframe days in the Navy, but I started working with BASIC on the 64 because I didn't want to miss a trick the system could perform.

Since I was living in Nevada at the time, my first program was a poker game. What I didn't know was that Bruce had his own doubts about my programming ability. He had certain fears that my work might resemble the submissions he rejected on a regular basis. I sent him my card game and he told me it was the best program he had ever received in the mail! (I had only been working with the machine three months). I remember him saying, "Boy, let's get you out of the Navy. I need you right here."

The Navy saw the last of me in June of 1984 and my first assignment at Access was to create an interesting title screen for *Raid Over Moscow.* I put together a striking image containing a hammer and sickle with the credits scrolling vertically off the screen. Even though I contributed some ideas to *Raid Over Moscow,* my real involvement in game programming began with *Beach Head II.*

Jermaine: Did you have any problems programming *Raid over Moscow?*

B. Carver: Whenever we put together a game, we try to convince the player that he or she is actually on a trip somewhere. Our second goal is to get the player involved in the story we present on the screen. *Raid Over Moscow* has the player piloting a jet around three-dimensional objects as the screen scrolls horizontally. It was very difficult to take a two-dimensional screen and make objects look and act three-dimensional.



Bruce and Roger Carver

Raid Over Moscow was also designed to make the player use his head more often, as opposed to just pointing a gun and pulling the trigger.

Most people think that *Raid Over Moscow* is strictly a nuclear holocaust simulation, but it actually takes place after total disarmament has supposedly occurred. The Russians launch a surprise nuclear attack, and our only hope for survival is an orbiting space station. The player must dispatch bombers from the floating station to knock out the launch sites of the Soviet missiles. Once this is accomplished, you proceed to Moscow for your final assault on the Russian defense center.

Speaking of the space station, some people from the Netherlands came to interview me about *Raid Over Moscow.* They brought their video tape cameras and everything for the project. All went well until I discovered the true reason for the interview. They wondered where I got the idea for the orbiting defense station in my program. This issue came up over a year before we heard about the President's Star Wars Defense System. I believe these gentlemen expected to uncover some state secret, but they left with the knowledge that I had dreamed it up in my head.

In the United States, we kept our ad campaign for *Raid Over Moscow* low key, but the promotion abroad was a different story. Access products are sold in the United Kingdom under the U.S. Gold label. Those people apparently live by the code that all press is good press, whether it's positive or negative. To begin, they made it common knowledge that a program called *Raid Over Moscow* would be available in London computer

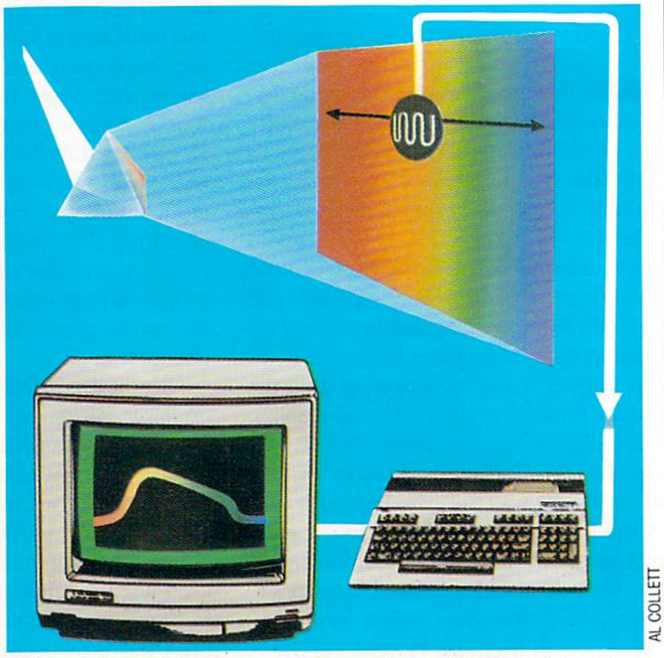
Continued on pg. 118

BY JOHN IOVINE

Interfacing Commodore's User Port, Part 3

How to Build Light and Heat Transducers, a Toxic Gas Detector, and a Bio-feedback Monitor

This month we examine serial interfacing and the 60 Hz interrupt routine. Using an off-the-shelf serial analog to digital converter available at Radio Shack, we are going to build light and heat transducers, a toxic gas detector, and a bio-feedback monitor for your VIC 20, Commodore 64 and 128.



As the photocell is drawn through the spectrum of light, the intensity at each wavelength is recorded to create a 'signature' graph of the light-source.

Previously, we have used parallel interfacing without explicitly stating so. Since you already have a working knowledge of parallel interfacing, we'll begin with this and then move on to serial interfacing.

Parallel interfacing transmits or receives 8 data bits simultaneously on eight parallel lines (called a data bus). As we have seen when using port B, we have the added advantage of being able to configure a combination of input/output lines on our 8-bit parallel port.

Before we begin, examine Figure 1 to refresh our memory of the basic definition of binary numbers. A binary 1 is equal to approximately 5 volts, a binary 0 to approximately 0 volts.

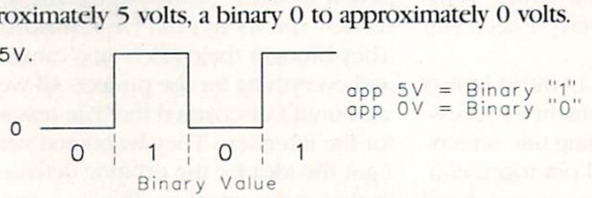


Figure 2 details our PB lines off the user port. By examining each bit, we obtain a total value of the eight bits, which is decimal #89.

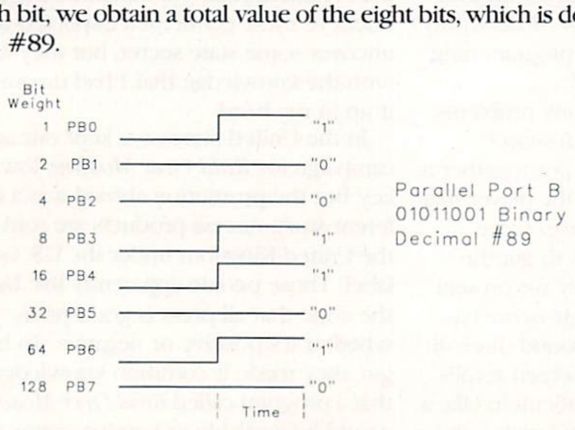
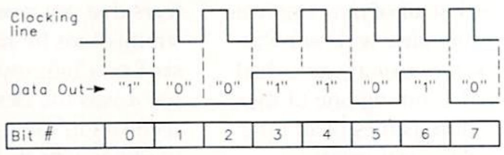


Figure 3 shows how the same information can be transmitted or received over a serial line. The first bit transmitted or received is bit 7. The clocking line correlates the precise moment to receive or transmit data on the line.



Commodore computers have a built-in serial register and clocking line that can receive or transmit data in such a fashion. This greatly simplifies our programming task.

Analog Events

What is meant by an analog event? This may appear to be an easy question to answer since we deal with analog events such as time, temperature and speed every day. To define briefly, an analog event is one in which the reading or measurement is infinitely variable between any two points (Mandelbrot Graphics). Let's examine one example: the voltages existing between 1 volt and 2 volts.

The possible voltage readings between these two points is infinite. It can have virtually any value, such as 1.1 volts or 1.00000001 volts or 1.0000000000000000001 volts. As you can see, voltages can vary by infinitesimal amounts making the number of possible readings infinite. The same is true for temperature, time, gravity, and a number of other phenomena.

Digital Events

Digital events occur in discrete predefined steps. A simple example is an electric light switch that has two predetermined states, on or off. A rising voltage digitally plotted against time

would not trace as a straight line (analog event), but would jump in increments in a staircase fashion.

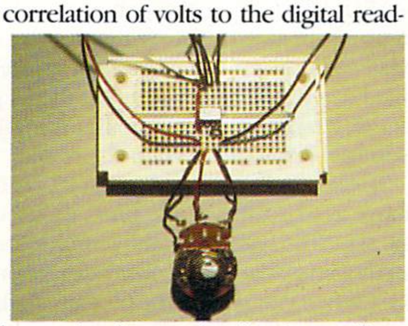
Serial Analog to Digital Converter Chip

An analog to digital converter does exactly what its name implies—it reads an analog voltage then converts it to the proportional digital (binary) value for use by the computer. In our case, this digital value is transmitted serially into the computer.

Radio Shack sells a serial A/D (analog to digital or ADC) converter chip for $6.95 (see Parts List). This is an 8-pin chip that is extremely easy to interface to our user port. Some of the chip's capabilities are maximum 40,000 samples per second, internal clock, and 8-bit conversion resolution.

We will utilize this chip extensively. To interface, we must solder two additional lines on our card connector. These two lines are the serial line and clocking line. For the Commodore 64 and 128, SP-2 is the serial and CNT-2 is the clocking line we'll use. For the VIC 20, the serial line is CB2 and the clocking line is CB1.

Construct the circuit on your experimenters breadboard. A 10K potentimeter is inserted between the +5 volt line and ground (pins 1 and 4). The wiper of the potentimeter is connected to pin 2 analog input of the A/D chip. This is a testing potentimeter for you to test the circuit and the program. Type in the respective program for your computer and run it. Vary the control knob on the potentimeter and observe the results on the screen. The numbers represent the digital equivalent of the voltage present on pin 2. If you have a volt meter handy, you can connect the meter between pin 2 (analog in) and ground to observe the correlation of volts to the digital readout.



The serial register in Commodore computers and the A/D chip is one byte (8 bits) long. The largest number one byte can contain is (binary 11111111) decimal 255. Since we read the computer's register to see what is happening in our circuits, the readings can vary from a minimum of 0 to a maximum of 255.

We know that this number represents the digital equivalent of the voltage present on pin 2. The relationship between them is this. Our Ref. voltages (Ref.+ minus Ref.-) divided by 255 equals volts per binary step (see figure 4). In circuit C1 our Ref. voltages are +5 volts and ground 0 volts. So 5/255 = .0196078431 volts per incremented step. Each time the voltage varies by this amount, our reading of the serial port would vary by 1 point. It follows then that if the computer is reading 100, we can take this number and multiply it by our volts per step and see what the voltage on pin 2 is. Let's do it: 100 x .0196078431 = 1.96078431 volts or approximately 2 volts.

By substituting different transducers for our testing potentimeter, we can have the computer sense and measure light, heat, toxic gas, and galvanic skin resistance.

Program

The BASIC program is slow and cumbersome. Later we will use a machine-language program that works with the 60 Hz interrupt. In the 64 and 128 BASIC program, we are using two additional registers aside from the ones we discussed in Part 1. They are the 56588 serial register and the 56589 interrupt control register. In the former, we peek the register to see what number our A/D chip transmitted; in the latter, we mask all interrupts.

The CRA control register, located at 56590, controls whether the serial line will be an input or output. This register has the proper configuration we need on power up, so it isn't necessary to change it.

We use PB 0 line to provide the clocking pulse to both the CNT line and the A/D chip. PB 1 provides the high to low pulse every eight clock cycles to start the chip transmitting its latest conversion.

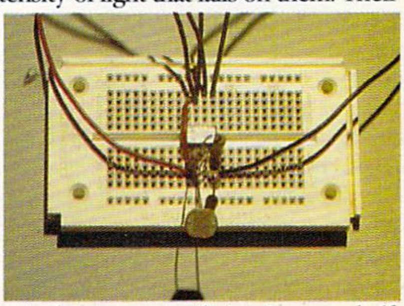
The VIC program operates in a similar manner. To understand the serial register, interrupt register and CRA, detailed information is provided in the Programmer's Reference Guide.

Transducers

The first of the transducers we will work with are variable resistor types. This means that as the sensor detects, the resistance of the sensor will change. This change in resistance changes the voltage drop across the transducer and is picked up as a varying voltage on pin 2 of our A/D chip. The voltage on pin 2 will be displayed as before, with changes in the transducer resistance tracking like varying the potentimeter did previously.

Light

Cadmium sulfide (CdS) photocells (Radio Shack P/N 276-1657) respond to the intensity of light that falls on them. Their resistance is greatest in complete darkness, and decreases in proportion to the light made available. Examine circuit C1. This is the simplest method of connecting the cell into the circuit.



The disadvantage in this particular application is that we are utilizing just one half (128-255) of our possible range 0-255. We easily correct this situation in circuit C2 by adding two resistors that make up a voltage divider. This changes our Ref.- from 0 volts to 2.5 volts. Our volts per step also change (Ref.+ minus Ref.- = Ref. voltage) 5v - 2.5v = 2.5v. Using the new Ref. voltage, we get 2.5/255=0.00980392157 volts per step. With circuit C2, we are reading voltages between 2.5 volts (Ref.-) and 5 volts (Ref.+). This gives us full scale operation with the photocell.

Applications

Now that we have a method of measuring light intensity, what are some applications for this device? If you are a photographer and do your own printing, you could use this as an exposure meter for your enlarger. In the high-tech end of applications, a spectrophotometer is possible. Spectrographic analysis is a method used by scientists to determine what elements are in an unknown compound. This technique was also used to determine the composition of the sun and stars.

Temperature

To measure temperature, simply replace the cds photocell with the heat transducer (thermistor) in circuit C2. The thermistor is an NTC (negative temperature coefficient) type that decreases in resistance as temperature increases. Resistance at 25 C (77 F) is 10,000 ohms. Maximum operating temperature is 150 C (302 F) (Digi-Key P/N KC006N-ND).

The resistor R1 that is in series with the transducer is good for sensing ambient room temperature and above. To change the scale and improve its response in the 0 to 120 degrees F range, replace R1 with a 47K resistor.

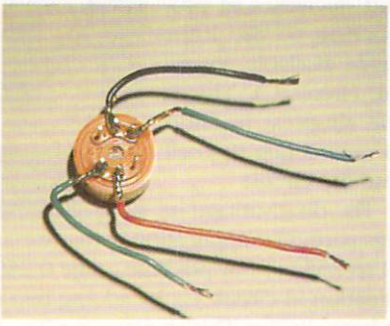
Note at this time that although we are changing the reading range of temperatures by changing the resistor R1, the volts per incremented step and the voltage reading range on pin 2 remain the same. The only way to adjust this is by changing the voltage divider resistors. If you should decide to change the voltage divider, make sure to remain within the range detailed in the specification sheet and pin out description.

Applications

Calibration is necessary before using this sensor for any critical operations. One method of calibration is to submerge the sensor first in cold ice water then in boiling hot water, marking each readout. The first number recorded is the equivalent of 32 degrees F, the second 212 degrees F. The most obvious applications are in electronic thermometer and thermostat control.

Toxic Gas Sensor

The Toxic Gas Sensor responds to a large number of airborne toxic compounds. Its operation is similar to the thermister in that as the sensor detects compounds, the resistance of the device decreases.



Pins 2 and 5 are connected to a heater coil inside the transducer. The heater coil requires 5 volts at approximately 115 mA. This current is beyond what the user port can supply. This mandated the addition of a battery powered supply with a 7805 5 volt voltage regulator.

Pins 4 and 6 are internally connected, as are pins 1 and 3. When you make your solder connectors to the sensor you need only connect to one pin of each pair (see photo).

Polarity isn't important for either the heater coil or sensor; any way you connect the wires the unit will function properly. You may notice that the sensor feels quite warm when operating; don't be alarmed, this is normal and is a result of the internal heating coil.

Change R1 in circuit C2 to a 47K resistor and connect the circuit as shown in figure 7. Since the sensor has been in storage prior to you receiving it, it will require an initial 2 minute warm-up period. This warm-up period decreases with use. After the warm-up period, you can test the sensor with a number of household items. I first used a butane gas lighter. By releasing gas near the sensor (unlite), the sensor reacted immediately, jumping from a base line of 0 to 255. By breathing on the unit it will detect the carbon dioxide. You can test and experiment with other items such as cleaning fluids.

Applications

You can use the toxic gas sensor for an automatic ventilator control or gas leak detector and alarm.

Bio-feedback Monitor

The bio-feedback device has two uses: one as a lie detector, second as a stress level measurement device. The device operates by detecting changes in the galvanic skin resistance of the person connected to the device.

A person's galvanic skin resistance at any particular time is an indicator of their state of arousal (emotional stress and tension level). This is called the base line conductance. The base line conductance will vary slightly as you use the bio-feedback device, making it necessary to adjust the device occasionally.



The electrodes are made by soldering a wire to a dime. To use, place a rubber band that fits snugly around the subject's wrist and place the dime electrodes underneath the rubber band.

Set both potentiometers at mid position when beginning. Attach both electrodes and use the R1 potentiometer to adjust the reading. When adjusting the R1, you'll notice a point where a small movement on the potentiometer causes the reading to jump up or down. This is the trigger point. Depending upon what application (lie detector/stress level monitor) you have in mind determines where to adjust the R1 potentiometer.

The R2 potentiometer adjusts the gain of the 741 Op-Amp. Normally you won't need to adjust this.

To use as a lie detector, adjust R1 until your reading is a little above zero. At this point, press the electrodes further against the skin. The reading on the monitor should jump to 255. (Remember to attach the electrodes before you begin adjusting R1.) When you release the pressure of the electrodes, the reading should fall to approximately what it was before. If this test works, you're ready to begin. If not, recheck all your wiring.

To use as a bio-feedback device to reduce stress, adjust R1 until you're almost reading 255. Now sit back and relax. Imagine yourself to be in any place or situation you find soothing. As your body responds, the readings will begin to fall. It is interesting to note that you can remain in a high state of awareness and still be completely relaxed—a sort of electronic Zen meditation. With practice, your ability to relax will develop and use of the machine will become unnecessary.

Until you become familiar with using the device, it can be frustrating to set the potentimeters for a good reading. Give yourself a little time to learn.

Applications

The bio-feedback device can be used as a lie detector and stress management device. More than this, it should be considered an exercise in physiological measurement. You are not limited to this device. Other devices such as EKG's and EEG's can be interfaced to the computer as well.

60 HZ Interrupt Vector

Commodore computers use one of the 6526 timers to issue an interrupt every 1/60 of a second. The interrupt routine that follows scans the keyboard to see if a key has been pressed, updates the real time clock, and performs a number of housekeeping functions. Our interest is not in the routine, but in utilizing the interrupt procedure for our own benefit.

A simple explanation of what happens when an interrupt is generated is as follows. When the microprocessor receives an interrupt signal, the program instruction that is currently being performed is finished. The address of the next instruction is stored, then the program is directed into the interrupt routine. Upon completion of the interrupt routine, the address stored is pulled off and our program picks up exactly where it left off.

This process happens continuously and transparently in the background of BASIC. Our reason for bringing this up is to utilize this routine by adding our own Serial A/D program to it. By doing so our program will be executed 60 times a second and is completely transparent to any program lying in BASIC. We can accomplish this by changing a vector in the interrupt routine (a vector is an address that directs the program to its next instruction) to point to our program before continuing to the standard interrupt routine.

Demo Interrupt

To gain appreciation of what we are doing, I've written a demo program. This program will transfer one of the computer's registers, the Y-Reg, into the user port. By connecting our LED interface from Part 1, we can examine the operation of the register as BASIC is running. This program must be written in machine language, so I wrote a BASIC loader for it. Save the program before you run because it erases itself from BASIC. The program displays and updates the Y-reg 60 times a second. Observe what happens as you type in a program, run a program, or load from a disk.

A/D Interrupt

These programs read the A/D chip 60 times a second and place the information in memory location 255. All you need to do is peek the location for the current value; the BASIC program we used before will not be needed when using this machine-language version.

After you have typed in and saved the program, run it and type in this line: 10 X=PEEK(255):PRINT X:GOTO10

This one line will print serial A/D conversion. The program is not affected by the RUN/STOP key, but a RUN/STOP and RESTORE will reset the vector. To reinitiate the program, SYS (the number in program). ■

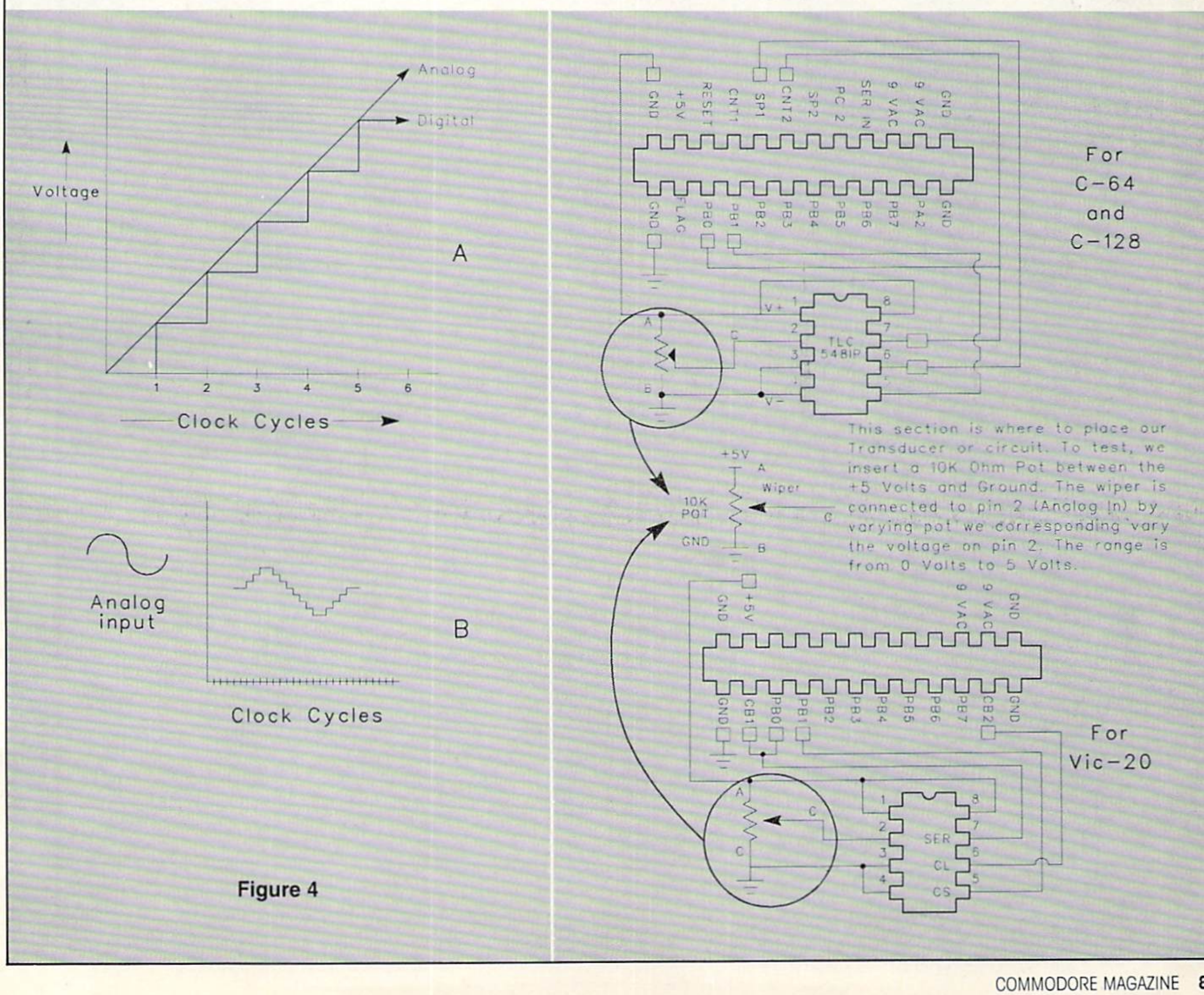


Figure 4

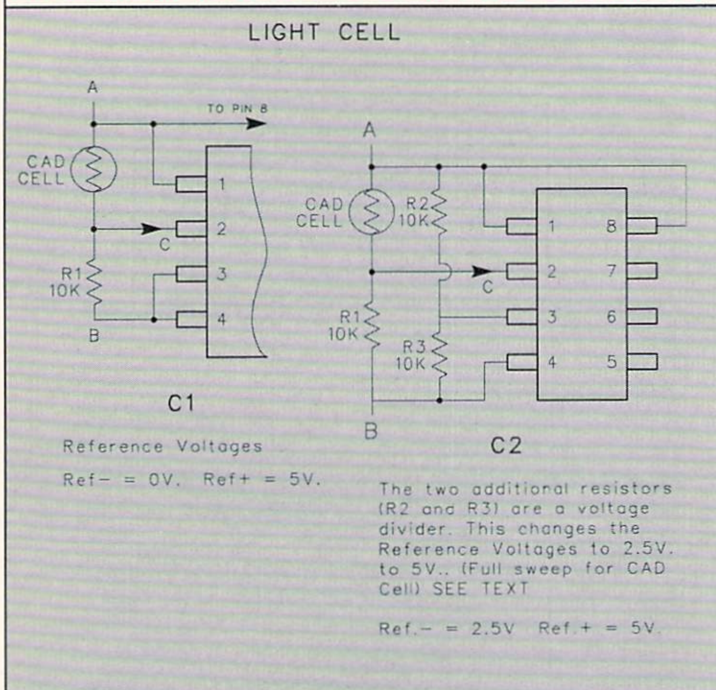


Figure 5

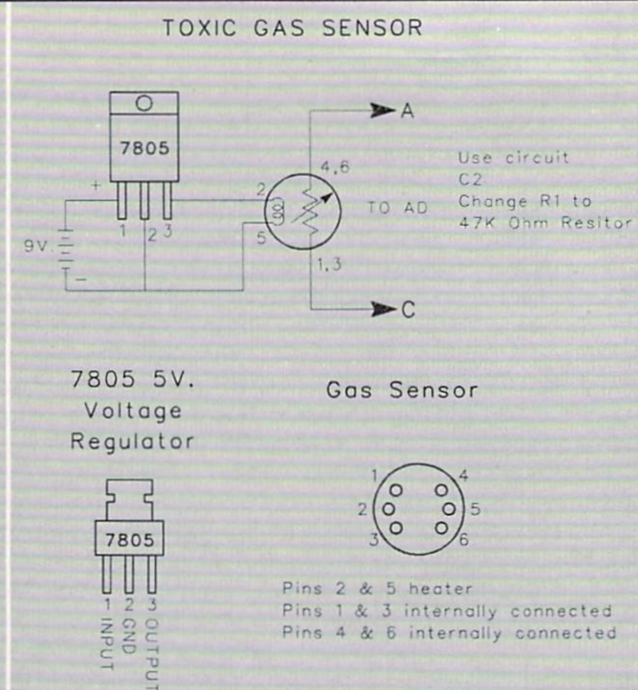


Figure 7

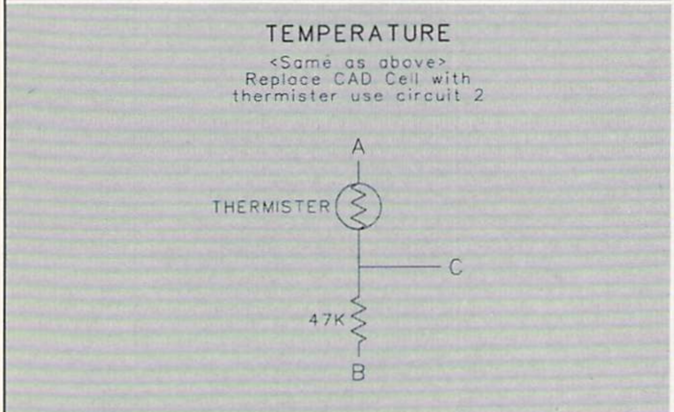


Figure 6

PARTS LIST

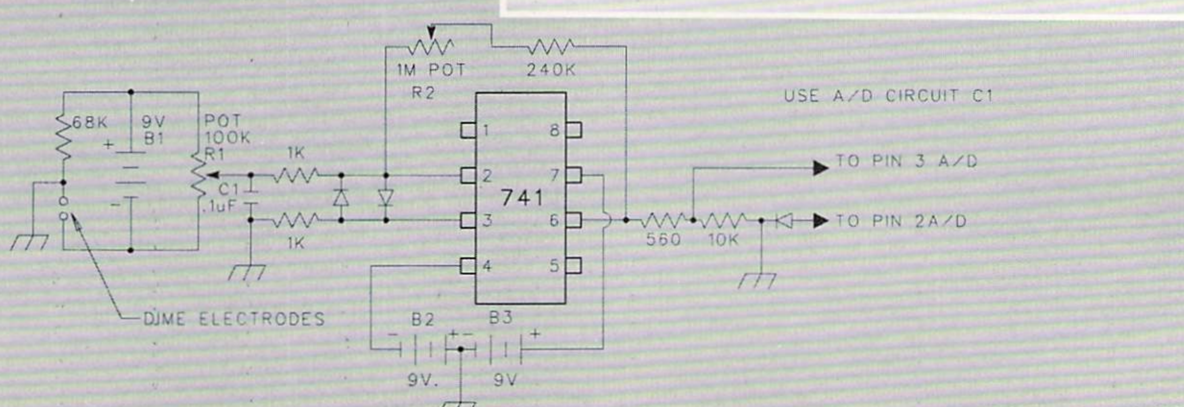
(all part numbers are Radio Shack unless specified)

Basic Setup				
Analog to Digital Converter		276-1796	$ 6.95	
(3) 10K Resistors		271-1335	$ .39	(pkg of 5)
Light Sensor				
Cadmium-Sulfide Photoresistor		276-1657	$ 1.98	(pkg of 5)
Heat Sensor				
NTC Thermistor	(Digi-Key PN#)	KC006N-NC	$ 1.94	
47K Resistor		271-1342	$ .39	(pkg of 5)
Toxic Gas Sensor				
Toxic Gas Sensor	(Figaro PN#)	TGS812	$10.50	
47K Resistor		271-1342	$ .39	(pkg of 5)
7805 Voltage Regulator		276-1770	$ 1.19	
Biofeedback Monitor				
741 Op-amp		276-007	$ .79	
(2) 1K Resistor		271-1321	$ .39	(pkg of 5)
68-75K Resistor				
100K Potentiometer		271-220	$ .59	
1 MEG Potentiometer		271-229	$ .59	
.1 uf disc Capacitor (50V)		272-135	$ .49	(pkg of 2)
560 Ohm Resistor		271-020	$ .19	(pkg of 2)
240K Resistor				
(3) Diodes 1N914		276-1620	$ 1.98	(pkg of 50)
10K Resistor		271-1336	$.39	(pkg of 5)
(3) B1,B2,B3 - 9Volt Batteries with snap caps				

Digi-Key Corporation
701 Brooks Ave. South
PO Box 677
Thief River Falls, MN 56701
1-800-344-4539

Figaro Engineering, Inc.
PO Box 357
322 Wilshire Drive East
Wilmette, IL 60091
312-256-3546

BIO−FEEDBACK

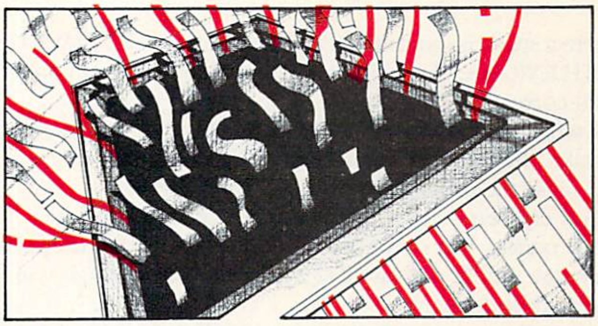


Continued on pg. 122

BY GERHARD F. SCHILLING

Enigma

for the Commodore 64 and 128



JOHN DZEDZY

Transform your Commodore into a real cipher machine.

Bletchley is a rural town some 50 miles north of London. In 1940, it became the birthplace of the Bronze Goddess, probably the world's first electronic computer. This is her story. At least, part of it.

Near the beginning of World War II, the British Intelligence Service managed to acquire a working model of Germany's secret cipher machine, the Enigma. It looked like a portable electric typewriter, but it had a transparent screen instead of a platen above the standard keyboard. In fact, it resembled a kind of clumsy version of today's portable computers.

Enigma was an electro-mechanical device that allowed military personnel to encipher and decipher secret messages rapidly and reliably. Given a message to be put into code (encipher), the operator first set certain switches according to a special code setting for the day. The switches linked an arrangement of drums in a specific way to establish the so-called code key. Then the operator typed the message just as on a typewriter. But he did this very slowly. There was no printing on paper.

Instead, when a key was pressed, a quite different letter or number appeared on the transparent screen, illuminated from below. This was the enciphered equivalent of the clear message, and the operator copied each character by hand for subsequent transmission by radio or telephone. For deciphering, the operator did the same with a coded message. In that case, the deciphered or original wording of the clear text appeared on the screen.

Sounds simple. But Allied intelligence services found it impossible to decipher intercepted enemy messages within a useful time span. The myriad of possible Enigma code settings called for more than the normal cryptanalytic techniques of the time. Hence, the birth of the Bronze Goddess. This magnificent structure was developed by a team of Oxford dons and engineers. The name reflected its appearance. Large!

With this early computer, British intelligence was eventually able to break the unbreakable German Enigma code and to decipher much of the German military traffic of secret messages and orders. The highly classified distribution mechanism of the decoded information among Allied leaders was itself codenamed Ultra. It contributed very importantly to the victories of World War II.

A fascinating account of how the British broke the Enigma code is given by F.W. Winterbotham in *The Ultra Secret* (Harper & Row, New York, 1974). The best overview of the world of modern intelligence services is probably found in *The Puzzle Palace* by James Bamford (Houghton Mifflin Co., Boston, 1982). He describes the development of cryptology from World War I through Enigma and the Bronze Goddess of World War II to the acres of computers, electronic listening posts, and fleets of spy satellites of today.

Enigma was a scientific marvel of its day. But so is your Commodore computer. With it, you can readily simulate how one of the later versions of Enigma worked.

The Enigma Program

The program will run as listed on both the 64 and the 128 with either a color or a monochrome TV. A printer is optional. If you have a 128 and an 80-column monitor, type the command FAST.

All you have to do is type the program in, save it and run it. Instructions on each screen will guide you from there.

The initial screen will display four lines of numbers, letters and the spacebar. This is a simulated replica of the original Enigma machine. The enciphered characters will be illuminated.

From the menu, start by selecting number 1, Encipher a Message. You will then be asked to establish the Secret Code Key. Enter a letter of your choice, then when prompted, a number between one and nine.

Next will come a request to Enter Clear Text. When you now press any alphanumeric key on the Commodore keypad, a letter, a digit or the space bar, it will be printed. Simultaneously, a quite different character will be highlighted on the replica above it. This is the enciphered equivalent of the key which you just pressed.

With the real Enigma, the operator had to copy each illuminated character on paper as it appeared. But the computer will do this for you. When you are finished with typing, hit the RETURN key. The screen will immedately display both your clear text and its enciphered wording. The letter should look like gibberish.

The menu will also be displayed again at the bottom of the screen. Selecting number 4 will Show the Code Key which you used, in case you have forgotten it. Number 5, Printer Output, will print both the clear and the enciphered text on your printer. At any time, you can call on number 3, Show Message in both Clear and Code.

To decode an enciphered message, select number 2, Decode an Enciphered Message. Follow the same procedure, except that you now enter letter by letter, or number by number, or empty space, any previously enciphered message. Of course, you have to know the code key that was used to encipher the message—unless you wish to go into codebreaking and have access to a super-computer.

As a test, select number 2 from the menu and enter the code key S 9. Now type the message ACPZ TKO AYEW PDMHTW. Be sure to enter the spaces as are; that is, tap the spacebar

where a space is indicated. If you get the clear text HAVE FUN WITH ENIGMA, you will know that you have typed in the program correctly.

A word of caution. As with the original Enigma machine, one mistake, the touch of a wrong key or the omission of a space, will cause the message to become real gibberish.

You can send enciphered messages to any friend who has this program. But only those whom you reveal the specific code key which was used to encipher that message will be able to decode them.

No problem in sending such messages by mail or via telephone and/or modem. But if you are an amateur radio operator or use commercial radio circuits, do not send coded messages over the air. This program is not a toy and produces truly enciphered text. Remember the Federal Communications Commission Rules and Regulations.

Cryptology

Cryptographers like to frown about confusing a code with a cipher. In a code, a certain word or phrase can stand for a place, a sentence, or a whole message. During World War II, D-Day stood for a secret date. You surely know what the code phrases SOS or Mayday mean. But codes are clumsy and sometimes require voluminous code books as thick as a telephone book. They are still used in the diplomatic services and by naval forces and, for short messages, in espionage work.

A cipher has much greater flexibility and permits the encoding of any message regardless of how complicated it is. The original message is called the clear or the clear text. With a cipher, each letter or symbol of the clear is represented by a corresponding but different letter or symbol. This is the enciphered or encoded message.

To decipher such a message is to reduce it to clear. Easy if you know the code key. But if you do not, then cryptanalysis and description are needed—fancy words for codebreaking.

Codebreaking is what the Bronze Goddess was all about. Today, thousands of cryptographers and cryptanalysts can be found at such secret institutions as the British GCHQ, the Government Communications Headquarters at Cheltenham and at our NSA, the National Security Agency at Fort George C. Mead; not to mention similar institutions in other countries.

Can you imagine what can be done, and is being done, with literally acres of computers dedicated these days to cryptography and cryptanalysis? Be assured that any cipher which you can produce with this program can be broken by them.

The Simulated Enigma Technique

The beginnings of cryptography go back to ancient times. One of the simplest ciphers, a single substitution cipher, is still called a Simple Caesar after the Roman Emperor Gaius Julius Caesar. This type is very easy to read.

The program employs a so-called variable double substitution cipher. It starts with a basic code key of your choice, consisting of a letter followed by a single-digit number. But the substitution of letters and numbers varies according to a system based on a variable code key, or simply the key.

The key is a mathematical expression which changes its value every time a new character is enciphered. This prevents that a specific letter of the clear shows always as the same transposed letter in the enciphered text, as in a Simple Caesar.

Keys employed in cryptography today can be extremely sophisticated mathematical functions. The listed program uses only a linear expression, in line 60, as the variable code key. But certain additional conditions change the key in a seemingly irregular way every time a new character is entered. This is sufficient to make deciphering without knowledge of the basic code key quite difficult.

Program Modifications

Experienced programmers will notice that the program is structured to permit modifications which can change it to become a really sophisticated cipher tool. And you are using only BASIC and a small personal computer!

Keyboard input is limited to letters, numbers and the spacebar. This can easily be changed to allow the use of punctuation marks or any other symbol. But reading such a cipher would be hard on one's eyes. Certain military traffic, such as radio teletype, uses symbols.

Preventing execution of line 60 with a temporary REM will give a Simple Caesar. On the other extreme, the key can be made much more complicated by replacing line 60 with a higher-order mathematical expression.

The Enigma replica sections 51-56 and 97-106 can be omitted completely and simply replaced by the simple lines 51 RETURN and 97 RETURN. The program will then run even faster. To increase the permissible length of messages beyond 160 characters, lines 57, 58 and 122 should be modified.

If you are a student of cryptography, you may want to avoid a known weakness of ciphers: the beginning word of the message. This program permits a simple solution—start any message with a confidential number of blank spaces; that is, tap the spacebar a certain number of times before typing your clear message. But in addition to the basic code key, you must then know this number and do the same when deciphering.

Whatever you do, please remember the caution about sending enciphered messages by radio. Somebody, somewhere, is always listening. ■

Before typing these programs, read "How to Enter Programs," and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Enigma

```
1 REM RUNS ON C-64 AND C-128 (40 OR
  80 COLUMNS)'BILI
2 ::REM FOR C-128 IN 80-COLUMN MODE,
  TYPE <FAST>'BLQK
3 CLR:GOSUB 121'CEVC
4 PRINT SPC(5) D$ B$ R$ X$ "MENU
  :" D$'CMGH
5 PRINT"1[SPACE2]ENCIPHER A
  MESSAGE"'BANI
6 PRINT"2[SPACE2]DECODE AN ENCIPHERED
  MESSAGE"'BAWM
7 PRINT"3[SPACE2]SHOW MESSAGE IN BOTH
  CLEAR AND" X$ R$ I$ "CODE" B$'BIMQ
8 PRINT"4[SPACE2]SHOW THE" X$ R$ Y$
  "CODE KEY" B$'BILN
9 PRINT"5[SPACE2]PRINTER OUTPUT"'BAFM
```

TECHNICAL TIPS/ENIGMA

```
10 PRINT"6[SPACE2]END THE
   PROGRAM"'BATC
11 PRINT D$ SPC(10) "SELECT NUMBER"
   :GOSUB 117'DJTF
12 GET N$:IF N$="" THEN GOSUB 114
   :GOTO 12'GLKE
13 IF N$ < "1" OR N$ > "6" THEN GOSUB
   117:GOTO 12'HKWG
14 N=VAL(N$):ON N GOTO 18, 18, 81, 15,
    107, 128'EBRI
15 IF L$="" THEN PRINT C$ SPC(9) Y$
   "NO KEY YET!" :GOTO 83'GLGK
16 PRINT C$ X$ R$ Y$ "THE SECRET CODE
   KEY IS:";'BJOL
17 PRINT SPC(2) L$ DI; B$:GOTO 4'DLVI
18 I=0:X=0:GG=5'DJCJ
19 PRINT C$ D$ R$ Y$ SPC(15) "SECRET
   CODE KEY:"'CLAN
20 PRINT B$ D$ "ENTER A LETTER (A-Z)"
   :GOSUB 117'CIXF
21 GET L$:IF L$="" THEN GOSUB 114
   :GOTO 21'GLGE
22 LL=ASC(L$):IF LL<65 OR LL>90 THEN
   GOSUB 117:GOTO 21'JVKK
23 KE=LL-64'CGND
24 PRINT D$ "NOW ENTER A NUMBER (1-9)"
   :GOSUB 117'CGNK
25 GET DI$:IF DI$="" THEN GOSUB 114
   :GOTO 25'GNJJ
26 IF DI$ < "1" OR DI$ > "9" THEN
   GOSUB 117:GOTO 25'HMYL
27 DI=VAL(DI$):PRINT C$'DKNJ
28 PRINT SPC(6) "PRESS ANY
   ALPHA-NUMERIC KEYS"'CCJP
29 PRINT SPC(10) "OR THE SPACE
   BAR."'CDON
30 PRINT X$ "(FOR MENU, OR TO END,
    PRESS <RETURN>)" D$'BEJK
31 GOSUB 97:GOSUB 117:IF N=2 THEN
   62'FLXF
32 PRINT"ENTER CLEAR TEXT:";'BBJG
33 GET K$(I):IF K$(I)="" THEN 33'ENEH
34 IF I=0 THEN PRINT U$:FOR G=1 TO 18
   :PRINT X$;:NEXT:GOTO 37'KRLM
35 I=I-1:Z$="":E=A:E$(I)=A$(I)
   :IF K=32 THEN W$=X$'JDVQ
36 GOSUB 51:W$=CHR$(95):I=I+1'FNGL
37 L=0:K=ASC(K$(I))'DLHK
38 IF K=13 THEN J=I:GOTO 81'FIEM
39 IF K=32 THEN A=32:GOTO 49'FJCN
40 IF K<48 OR K>90 THEN 33'FIXF
41 IF K>57 AND K<65 THEN 33'FIYG
42 IF K>64 THEN L=26'EGDF
43 IF K<58 THEN L=10'EGBG
44 PRINT H$;:FOR G=1 TO GG+7:PRINT D$;
   :NEXT'HOFL
45 PRINT SPC(X) K$(I):GOSUB 60'DKUI
46 A=K+KE'CETI
47 IF L=26 AND A>90 THEN A=A-26'HKHN
48 IF L=10 AND A>57 THEN A=A-10'HKVO
49 A$(I)=CHR$(A):Z$=I$:E=A
   :E$(I)=A$(I)'FCOS
```

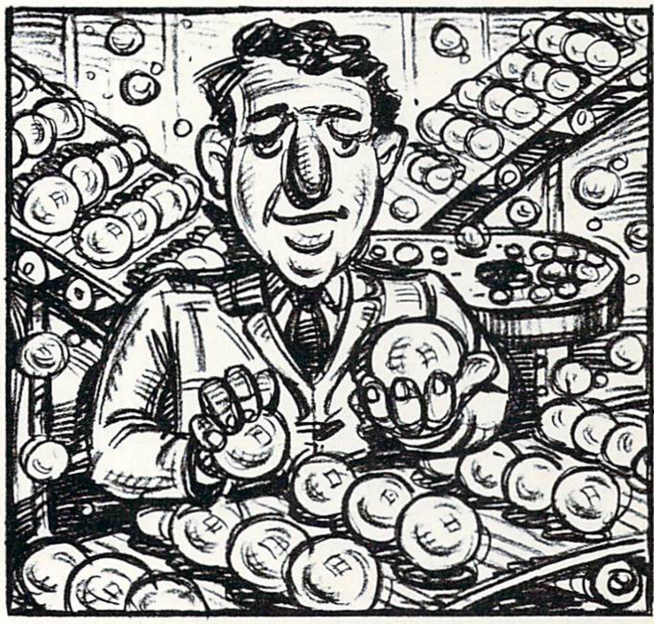
```
50 GOSUB 51:GOSUB 57:GOTO 33'DIDE
51 PRINT H$;:FOR G=1 TO 5:PRINT D$;
   :NEXT'GMWI
52 IF E=32 THEN PRINT D$ D$ D$ D$ Z$
   TAB(23) W$'FSPJ
53 IF L=10 THEN PRINT SPC(2*E-88) D$
   Z$ E$(I)'HRGM
54 IF L=26 AND E<78 THEN PRINT D$ D$
   SPC(2*E-125) Z$ E$(I)'JXEP
55 IF L=26 AND E>77 THEN PRINT D$ D$
   D$ SPC(2*E-151) Z$ E$(I)'JAXR
56 PRINT B$:RETURN'CDXI
57 I=I+1:X=X+1:IF I=40 OR I=80 OR
   I=120 THEN X=0:GG=GG+1'OBGX
58 IF I=160 THEN J=I:PRINT C$ "LONG
   ENOUGH - SELECT 3":GOTO 4'GLAU
59 RETURN'BAQK
60 KE=KE+(DI * I):IF KE > L THEN
   KE=KE-(INT(KE/L) * L)'LAGP
61 RETURN'BAQD
62 PRINT R$ I$ "ENTER CIPHERED TEXT
   :"B$;'BHAL
63 GET A$(I):IF A$(I)="" THEN 63'ENMK
64 IF I=0 THEN PRINT U$:FOR G=1 TO 20
   :PRINT X$;:NEXT:GOTO 67'KRHP
65 I=I-1:Z$="":E=K:E$(I)=K$(I)
   :IF K=32 THEN W$=X$'JDQT
66 GOSUB 51:W$=CHR$(95):I=I+1'FNGO
67 L=0:A=ASC(A$(I))'DLMN
68 IF A=13 THEN J=I:GOTO 81'FIYO
69 IF A=32 THEN K=32:GOTO 79'FJFQ
70 IF A<48 OR A>90 THEN 63'FIGI
71 IF A>57 AND A<65 THEN 63'FIHJ
72 IF A>64 THEN L=26'EGSI
73 IF A<58 THEN L=10'EGQJ
74 PRINT H$;:FOR G=1 TO GG+7:PRINT D$;
   :NEXT'HOFO
75 PRINT SPC(X) R$ I$ A$(I) B$
   :GOSUB 60'DQCN
76 K=A-KE'CEUL
77 IF L=26 AND K<65 THEN K=K+26'HKKR
78 IF L=10 AND K<48 THEN K=K+10'HKCR
79 K$(I)=CHR$(K):Z$=R$:E=K
   :E$(I)=K$(I)'FCNV
80 GOSUB 51:GOSUB 57:GOTO 63'DIGH
81 PRINT C$;:IF I>0 THEN 86'EIMJ
82 PRINT SPC(9) I$ "NO MESSAGE
   YET!"'CEPM
83 PRINT "SELECT 1 OR 2 FROM MENU
   FIRST:"'BAUP
84 IF PR$="OPEN" THEN RETURN'EDJM
85 GOTO 4'BBNJ
86 PRINT"YOUR MESSAGE IN CLEAR:"'BABQ
87 PRINT:FOR I=0 TO J-1:PRINT K$(I);
   :NEXT'HNCS
88 PRINT:PRINT'CBHN
89 PRINT R$ I$ "YOUR MESSAGE IN CODE
   :"'BEUU
90 PRINT:PRINT R$;:FOR I=0 TO J-1'GJEK
91 IF N=5 THEN PRINT A$(I);
   :GOTO 94'FLFL
92 IF A$(I) <> X$ THEN PRINT A$(I);
   'FNCM
93 IF A$(I)=X$ THEN PRINT B$
   CHR$(146) X$ R$ I$;'FVUP
94 NEXT:PRINT:IF N=5 THEN RETURN'GEGN
95 FOR G=1 TO 39:PRINT CHR$(146)
   CHR$(99);:NEXT'HQSR
96 PRINT U$;:GOTO 4'CFRN
97 FOR G=1 TO 39:PRINT CHR$(184);
   :NEXT'GMHS
98 PRINT:PRINT SPC(8)'DDOP
99 FOR G=48 TO 57:PRINT CHR$(G) X$;
   :NEXT'GNEU
100 PRINT:PRINT SPC(5)'DDLW
101 FOR G=65 TO 77:PRINT CHR$(G) X$;
    :NEXT'GNFC
102 PRINT:PRINT SPC(5)'DDLY
103 FOR G=78 TO 90:PRINT CHR$(G) X$;
    :NEXT'GNEE
104 PRINT:PRINT SPC(13) "SPACE
    BAR"'DEIE
105 FOR G=1 TO 40:PRINT CHR$(185);
    :NEXT'GMAG
106 PRINT:RETURN'CBVC
107 PRINT C$ SPC(10) "PRINTING"'CFMG
108 PR$="OPEN":OPEN 4,4:CMD 4'DJMI
109 GOSUB 81:PRINT'CDAF
110 PRINT"WARNING: NEVER TRANSMIT
    CODE BY RADIO!"'BAYG
111 PR$="CLOSED":PRINT# 4:CLOSE 4'DHAC
112 PRINT SPC(10) U$ "FINISHED
    PRINTING"'CFNF
113 GOTO 4'BBNY
114 PRINT U$ SPC(24) W$'CHSC
115 FOR G=1 TO 200:NEXT
    :PRINT U$ SPC(24) X$'GODH
116 FOR G=1 TO 100:NEXT:RETURN'FHYG
117 POKE S+24,15:POKE S+1,110
    :POKE S+5,9:POKE S+6,9'IXAN
118 POKE S+4,17:POKE S+4,16
    :RETURN'FMJJ
119 PRINT U$ SPC(10) "END OF
    PROGRAM."'CFOL
120 FOR JJ=0 TO 24:POKE S+24,0:NEXT
    :END'HNHE
121 S=54272:GOSUB 117:POKE 53280,14
    :POKE 53281,6'ECDG
122 DIM K$(160), A$(160), E$(160)'BXKD
123 C$=CHR$(147):H$=CHR$(19)
    :X$=CHR$(32):B$=CHR$(154)
    :I$=CHR$(5)'KKDO
124 U$=CHR$(145):D$=CHR$(17)
    :R$=CHR$(18):Y$=CHR$(158)
    :W$=CHR$(95)'KLJP
125 PRINT C$ B$ SPC(13) "E N I G M
    A"'CHOG
126 PRINT X$ "GERMAN CIPHER MACHINE
    OF WORLD WAR II" D$'BETO
127 GOSUB 97:RETURN'CDVF
128 FOR JJ=0 TO 24:POKE S+24,0
    :NEXT'GMBL
129 PRINT U$ SPC(10) "END OF PROGRAM."
    :END'DGAM
```

END

BY ROYAL C. JONES

Making the Bubble Better

Improvements on a Familiar Sorting Method



JIM OWENS

The bubble sort is the sorting method used by programmers who do not have to be fussy about the algorithm they choose. It is easy to remember and quick to write, and with a little luck it will not bring your program to a grinding halt while it ponders endless permutations. Let's admit from the start that the bubble sort is not the method of choice for lengthy sorting tasks, particularly where time is of the essence. For a comparison of the major sorting methods see "An Introduction to BASIC List Sorting" by David R. Brooks (*Commodore Microcomputers*, January/February, 1985). But the bubble sort does not have to be as bad as its reputation. A few improvements can make it considerably more efficient than the plodding method we take for granted.

My interest in the bubble sort was piqued by a homework assignment in a beginning FORTRAN course that I took in the fall of 1983. Here is an adapted version of the algorithm as it was presented.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Listing 1 Standard Bubble Sort

```
10 I=RND(-1000):REM  RANDOM SEED'ESEE
20 N=50:REM  NUMBER OF ELEMENTS'CUHE
30 DIM A(N):REM  ARRAY OF'CMQD
40 FOR I=1 TO N:REM  RANDOM
   NUMBERS'ERSH
50 A(I)=INT(RND(1)*N):NEXT'FLIG
60 FOR I=1 TO N:REM  OPTIONAL
   DISPLAY'ETCJ
70 PRINT A(I),:NEXT:PRINT'DHVG
80 TM=TI:REM  NOTE STARTING TIME'CVML
90 :'ABHF
100 FOR I=N-1 TO 1 STEP-1'GFAA
110 FOR J=1 TO I'DDEX
120 IF A(J)<=A(J+1)GOTO 140'FMKC
130 T=A(J):A(J)=A(J+1):A(J+1)=T'FWMG
140 NEXT J'BBDY
150 NEXT I'BBCA
1000 :'ABHS
1010 TM=(TI-TM)/60:REM  FINISHING
     TIME'EYED
1020 FOR I=1 TO N:REM  OPTIONAL
     DISPLAY'ETCC
1030 PRINT A(I),:NEXT:PRINT'DHVY
1040 PRINT"ELAPSED TIME
     ="TM"SECONDS"'BCGE
```

END

The algorithm itself, which appears in lines 100 to 150, is essentially the same as the one given by Brooks in the article mentioned, with a few differences in detail. We will be using the shell of this program, that is, lines 10 to 90 and lines 1000 to 1040, for all of the algorithms to be considered. The random seed in line 10 assures that the same sequence of random numbers will be used for testing purposes. The number of elements in the list can be changed in line 20.

The first improvement to be considered is not really an improvement at all. I include it only because it was part of the original homework assignment and does illustrate the kind of problem that can arise in tinkering with a method. To the first listing add the following lines:

105 F = 1
125 F = 0
145 IF F GOTO 1010

The idea is to avoid further comparisons in a list that has already been sorted. The flag F is set with each pass through the outer loop. If the program makes it through the inner loop without having to switch elements (line 130), then the sort is complete and the escape is made in line 145. The number of loops is usually reduced by this trick, but in BASIC the cost of maintaining the flag produces a net loss in efficiency for most applications.

Not being one to rest content with such modest results, I set out to find a real improvement of the bubble sort and after a few sleepless nights came up with the following.

Listing 2 Getting the Wrinkle Out

```
10 I=RND(-1000):REM  RANDOM SEED'ESEE
20 N=50:REM  NUMBER OF ELEMENTS'CUHE
30 DIM A(N):REM  ARRAY OF'CMQD
40 FOR I=1 TO N:REM  RANDOM
   NUMBERS'ERSH
```

```
50 A(I)=INT(RND(1)*N):NEXT'FLIG
60 FOR I=1 TO N:REM  OPTIONAL
   DISPLAY'ETCJ
70 PRINT A(I),:NEXT:PRINT'DHVG
80 TM=TI:REM  NOTE STARTING TIME'CVML
90 :'ABHF
100 FOR I=1 TO N-1'EEWX
110 IF A(I)<=A(I+1)GOTO 160'FMKB
120 FOR J=I TO 1 STEP-1'FEGB
130 IF A(J)<=A(J+1)GOTO 160'FMMD
140 T=A(J):A(J)=A(J+1):A(J+1)=T'FWMH
150 NEXT J'BBDA
160 NEXT I'BBCB
1000 :'ABHS
1010 TM=(TI-TM)/60:REM  FINISHING
     TIME'EYED
1020 FOR I=1 TO N:REM  OPTIONAL
     DISPLAY'ETCC
1030 PRINT A(I),:NEXT:PRINT'DHVY
1040 PRINT"ELAPSED TIME
     ="TM"SECONDS"'BCGE
```

END

An unusual feature of this program is that it sorts the list at each step in the outer loop before proceeding to the next element. When the program comes to an element that is out of order, it brings the element back by a succession of switches to a point where the wrinkle is out. At this point, the element is correctly placed and the inner loop is foreshortened. The resulting increase in efficiency is seen in the Table of Running Times.

The comment on my completed assignment—"Looks good!"—was perhaps all that could be expected from a harassed community college instructor. Considering the matter further, I began to share his lack of enthusiasm. My improvement, first of all, is only marginally better than a simpler and more efficient version of the bubble sort that, come to think of it, I had encountered in a previous course.

Listing 3 Simple Bubble Sort

```
10 I=RND(-1000):REM  RANDOM SEED'ESEE
20 N=100:REM  NUMBER OF ELEMENTS'CVVF
30 DIM A(N):REM  ARRAY OF'CMQD
40 FOR I=1 TO N:REM  RANDOM
   NUMBERS'ERSH
50 A(I)=INT(RND(1)*N):NEXT'FLIG
60 FOR I=1 TO N:REM  OPTIONAL
   DISPLAY'ETCJ
70 PRINT A(I),:NEXT:PRINT'DHVG
80 TM=TI:REM  NOTE STARTING TIME'CVML
90 :'ABHF
100 FOR I=1 TO N-1'EEWX
110 FOR J=I+1 TO N'EEVY
120 IF A(I)<=A(J)GOTO 140'ELVB
130 T=A(I):A(I)=A(J):A(J)=T'DUJE
140 NEXT J'BBDY
150 NEXT I'BBCA
1000 :'ABHS
1010 TM=(TI-TM)/60:REM  FINISHING
     TIME'EYED
1020 FOR I=1 TO N:REM  OPTIONAL
     DISPLAY'ETCC
1030 PRINT A(I),:NEXT:PRINT'DHVY
1040 PRINT"ELAPSED TIME
     ="TM"SECONDS"'BCGE
```

END

This is the version of the bubble sort that I use in offhand programming. Instead of the maximum (or minimum) element bubbling up to its position as in the traditional sort, it goes more directly to its position at A-sub-I, and the result is greater efficiency. This might be a good place to point out that all of the examples used here produce lists in ascending order. Producing descending order is usually just a matter of reversing an operator, in this case, replacing $<=$ by $>=$ in line 120. A slight improvement on this simple bubble sort yields an algorithm that is definitely better than my invention in Listing 2.

Listing 4 M-Search Bubble Sort

```
10 I=RND(-1000):REM  RANDOM SEED'ESEE
20 N=100:REM  NUMBER OF ELEMENTS'CVVF
30 DIM A(N):REM  ARRAY OF'CMQD
40 FOR I=1 TO N:REM  RANDOM
   NUMBERS'ERSH
50 A(I)=INT(RND(1)*N):NEXT'FLIG
60 FOR I=1 TO N:REM  OPTIONAL
   DISPLAY'ETCJ
70 PRINT A(I),:NEXT:PRINT'DHVG
80 TM=TI:REM  NOTE STARTING TIME'CVML
90 :'ABHF
100 FOR I=1 TO N-1:M=I'FHCY
110 FOR J=I+1 TO N'EEVY
120 IF A(M)>A(J)THEN M=J'EKFB
130 NEXT J'BBDX
140 T=A(I):A(I)=A(M):A(M)=T'DUPF
150 NEXT I'BBCA
1000 :'ABHS
1010 TM=(TI-TM)/60:REM  FINISHING
     TIME'EYED
1020 FOR I=1 TO N:REM  OPTIONAL
     DISPLAY'ETCC
1030 PRINT A(I),:NEXT:PRINT'DHVY
1040 PRINT"ELAPSED TIME
     ="TM"SECONDS"'BCGE
```

END

The trick here is simply to postpone the switch routine (line 140) until the subscript of the minimum element has been stored away in variable M. By a series of modest improvements we have thus managed to cut the execution time of the original program in half.

I filed my homework assignment away in a collection of clever but flawed ideas and hardly gave it a thought until recently when I needed a sorting routine for a short list of names. Psychologists say that the creative process may go on in the deep recesses of one's mind for long periods of time without calling attention to itself. Whether or not my subconscious had been at work, I felt as soon as I picked up the algorithm again that there was an improvement to be found. With little effort, I came up with the following.

MAKING BUBBLE BETTER

Listing 5 Realistic Buble Sort

```
10 I=RND(-1000):REM  RANDOM SEED'ESEE
20 N=100:REM  NUMBER OF ELEMENTS'CVVF
30 DIM A(N):REM  ARRAY OF'CMQD
40 FOR I=1 TO N:REM  RANDOM
   NUMBERS'ERSH
50 A(I)=INT(RND(1)*N):NEXT'FLIG
60 FOR I=1 TO N:REM  OPTIONAL
   DISPLAY'ETCJ
70 PRINT A(I),:NEXT:PRINT'DHVG
80 TM=TI:REM  NOTE STARTING TIME'CVML
90 :'ABHF
100 FOR I=1 TO N-1'EEWX
110 IF A(I)<=A(I+1)GOTO 160'FMKB
120 T=A(I+1)'CGMY
130 FOR J=I TO 1 STEP-1'FEGC
140 IF A(J)>T THEN A(J+1)=A(J)
    :NEXT J'GQSG
150 A(J+1)=T'CGNC
160 NEXT I'BBCB
1000 :'ABHS
1010 TM=(TI-TM)/60:REM  FINISHING
     TIME'EYED
1020 FOR I=1 TO N:REM  OPTIONAL
     DISPLAY'ETCC
1030 PRINT A(I),:NEXT:PRINT'DHVY
1040 PRINT"ELAPSED TIME
     ="TM"SECONDS"'BCGE
```

END

The improvement, once again a simple idea, is to replace a series of switching maneuvers involving element (I) with a single jump to its correct place in the list. I call this algorithm realistic because it resembles the method used in manual sorting tasks. In sorting a batch of index cards, for example, a person would ordinarily take the next card to be sorted and look back among the cards already sorted for its correct place. This is essentially what this bubble sort does.

Once a programmer starts to make improvements in a program, it is sometimes hard to stop. It can be argued that in doing a manual sort a person does not really look back one element at a time to find the place for the next element, but instead uses something called a binary search. I have managed to incorporate this idea in a further improvement of the bubble sort. The algorith is a bit complicated, however, and a listing would be out of place in this article. The spirit of the bubble sort, after all, is to get the job done with a minimum of fuss. C

Table of Running Times
(in seconds)

	N = 50	100	150	200	250
1. Standard Bubble Sort	26	104	236	415	646
With Flags	28	110	249	440	679
2. Getting the Wrinkle Out	20	74	167	288	444
3. Simple Bubble Sort	20	77	173	303	474
4. M-Search Bubble Sort	13	51	113	200	310
5. Realistic Bubble Sort	11	40	89	153	234

C

BY GARY V. FIELDS

Total Control
for the Commodore 64

Total Control is a short subroutine that will give you complete control of INPUT prompts in your own programs. It uses only 17 lines and is easy to add to your own programs.

Total Control eliminates the problems associated with the BASIC INPUT statement. If you write your own programs, you have used INPUT. It accepts information from the person using the program. INPUT statements in a business program ask for things like names, Social Security numbers and account numbers. In educational programs, INPUT prompts ask for answers, directions and colors.

But the INPUT statement is often careless with the answer. Because it will accept all the keys on the 64's keyboard, INPUT allows you to use symbols, change text color or even clear the screen. If a cursor key is pressed during an INPUT cycle, the cursor moves. This usually garbles the answer and spoils the screen display. And you type a comma as part of the input, the computer will print the often confusing EXTRA IGNORED message. Basically, the problem with INPUT is it allows too much freedom.

If you don't use INPUT, then you only have the GET statement as an option. GET doesn't print to the screen, doesn't give the question mark prompt, and does a dozen other nasty things I could list. Total Control is a subroutine built around the GET statement. Using GET alone does have limitations.

But when used inside Total Control, those restrictions are overcome. The subroutine collects characters as they are typed. But characters you don't want to input, like cursor keys and symbols, are simply ignored. When you are finished, Total Control doublechecks to be sure. If you want to change your answer, you can either erase it and start from scratch or delete characters by using the INST/DEL key.

How to Use the Program

A subroutine is a collection of BASIC lines which perform a specific chore. It is normally executed from a GOSUB statement and when completed returns to the line following the GOSUB statement via the RETURN statement. To use the Total Control subroutine in your own programs, just plug its 17 lines into your own program and you are ready to go.

Total Control eliminates the problems associated with the BASIC INPUT statement.

For those who want to understand how Total Control handles input, study the listing. Seventeen lines (10 and 40-60) are all that are used. The remaining are just for testing.

When you run the Total Control test program, the screen will clear. Instructions will appear at the top of the screen in black type. Below the instructions the prompt FIRST NAME will be displayed above a rectangle, 12 columns wide. The first character in the rectangle is the left bracket symbol. It is followed by nine reversed spaces, a period. and a closing bracket.

Your response to the FIRST NAME prompt will appear inside this rectangle. You can input only nine characters. When the period is reached, more typing simply overwrites the last character. The INST-DEL key is active during this phase and can be used to edit the name.

When you decide to accept the name, press RETURN. A question mark appears asking "Is this correct?" If you then press F1 as instructed by the screen, the nine-character display will be accepted and the prompt for LAST NAME will appear.

If you press any key other than F1 (to accept an answer), the block will be cleared and you can rekey your answer. This continues until all the prompts are answered.

In many situations, you want the input to be restricted to a certain length. The LE variable in lines 110, 112, 114, 116, 118 and 120 in the example program does this. To add this control to your own program, simply define LE's value (length) before jumping (GOSUB 40) to the Total Control subroutine.

The purpose of the rectangle is to help the user of your program. By displaying a reverse space between brackets where the answer will appear, you can judge the length of the expected answer. The subroutine itself restricts input to only the alphabet, numeric keys, and the most often-used symbols. All others are ignored. This prevents you from accidentally clearing the screen or leaving the input line via the cursor controls.

Caution

Be careful reusing the variables used by Total Control. The important variables are L$, U$, NI$, C$, Q$, LE, X and Y. All except L$, U$ and NI$ are used for temporary storage. So you can use C$, Q$, LE, X and Y in your program, for *temporary* storage if you wish. But be aware that their value will be changed each time Total Control is executed. The safest course is to not use these eight variables in your main program.

Line-by-Line Explanation

Line 10: This line is very important. It defines variables L$ and U$ and dimensions NI$. L$ is used to move the screen editor LEFT, while U$ moves it up one row. These two variables are important to stabilize and control the screen format.

DIMNI$(35) is a dimension statement. NI$(1) thru NI$(35) are used to gather input. A DIM statement must be executed only once. The longest answer Total Control allows is 35 characters long. This restriction is forced by the 64's 40-column screen display. In most business or educational applications, this limitation should present no problem. The information in line 10 must appear somewhere near the beginning of your own program. This is one of the important 17 Total Control lines.

POKE788,52 disables STOP so you can't accidentally break the program. POKE788,49 will restore STOP.

Line 11: Print CHR$(147) clears the screen. Then the program jumps around the Total Control subroutine (40-60) and goes to the beginning of the test program at line 100.

Line 40: POKE 198,0 empties the keyboard buffer.

Line 41: This line displays the reverse spaced rectangle prompt. The first PRINT statement reverses the type and prints the left bracket. This is followed by a loop which uses the value of LE to measure the size of the input rectangle. Final-

ly, the trailing period and closing bracket is printed. The U$ at the end moves the screen prompt up one row so typing will appear in the rectangle. NOTE: The LE variable stands for length of input, and it cannot be greater than 35. Examples of how LE's value is set are in lines 110, 112, 114, 116, 118 and 120.

Line 42: This line establishes the count for the main loop. C$, the variable in which the final input is temporarily stored, is emptied. The screen editor is positioned one character left of the opening bracket in the prompt rectangle. The FOR X = 1 TO LE + 1 loop is begun.

Line 43: As the loop works, the value of X will be added to or sub-tracted from according to how many characters are printed or deleted. This line prevents the count from falling below one, because falling below one would garble the input as well as the screen display.

Line 45: This is the standard GET statement. If no keys are pressed, the program just waits at line 45.

Line 47: If the screen editor moves into the first screen column, Total Control knows the left bracket has been deleted. This line reprints the leading bracket and repositions the screen editor in column one.

Line 48: This line looks for the RETURN key. If it is pressed, the Y loop spaces out the remaining line. The value of LE is copied into the X variable, and the program skips lines 49-55 with GOTO57.

Line 49: This line looks for the INST-DEL key. If this key is pressed, it moves the screen editor to the left and erases the last character typed. The X count is subtracted from and NI$ is adjusted to reflect the effect of a character being deleted. The program then jumps back to the main loop: GOTO43.

Line 50: This line decides which characters are legal. If the value of the key pressed is less than CHR$(32), a space, or if the value is greater than CHR$(93), the right bracket, or is CHR$(34), the quote symbol, the input is ignored. All other keys are accepted.

Line 51: If you have filled the rectangle but haven't pressed RETURN, the last character is replaced with whatever key is pressed.

Line 53: This copies the current key into the current value of NI$.

Line 55: This line positions the screen editor just to the right of the last printed character and prints the new character.

Line 57: This line signals that the RETURN key has been pressed. The values of NI$ are added together to form the variable C$. The current value of NI$ and Q$ are emptied.

Line 58: This is the second GET loop. This loop looks for the signal that the input is correct.

Line 59: If any key other than F1 is pressed, the Total Control subroutine is re-entered, the rectangle emptied, and the cycle repeated.

Line 60: If the F1 key is pressed, Total Control is finished and will return to the line following the GOSUB command which activated it. It will carry with it the current value of C$ which will be transferred into a permanent variable. See lines 111, 113, 115, 117, 119 and 121 for examples.

The Test Program

Lines 100-206 are the test lines of Total Control.

Lines 100-102: These lines simply print instructions. The CHR$(5) changes the screen type color to white.

Line 110: The variable LE is set at nine. This means that when Total Control is executed with GOSUB40, it will accept an answer only nine characters long. Next the words FIRST NAME are printed on the screen. The GOSUB40 activates Total Control.

Line 111: When you have answered the FIRST NAME prompt, the answer will be stored in the variable C$ (see line 57). When the program returns from Total Control, it will land here on line 111. NA$ = C$ copies the nine characters stored in C$ into the permanent variable NA$.

Lines 112-115: These lines are exactly like lines 110 and 111 except the value of LE changes and C$ is copied into variables LA$ (Last Name) and AC$ (Account Number).

Lines 116-117: These lines are a little different. These lines are looking for a numeric value instead of a word. Total Control collects input, but line 117 copies not the contents of C$ but the value of C$ into the variable AM. This is done with AM = VAL(C$).

Lines 118-121: Demonstrate Total Control's maximum (LE = 35) and minimum (LE = 1) capacity.

Lines 200-206: These lines echo the information stored in variables NA$, LA$, AC$, AM, CO$ and GR$ to the screen.

Customizing Total Control

Now that you understand how Total Control works, you may want to customize it to suit your own programming style. You might prefer dashes or question marks instead of the reverse spaces I use. Or you might want to add another subroutine which would give some audio response each time a key is pressed or a tone when the line is full. Or you might even want to be more restrictive or more liberal on what Total Control will accept as input.

How you change the Total Control subroutine doesn't really matter, as long as you maintain control, letting in all that's allowable, and restricting all else. ■

Before typing these programs, read "How to Enter Programs," and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Total Control

```
10 L$=CHR$(157):U$=CHR$(145)
   :DIM NI$(35)'FXIF
11 PRINT CHR$(147):GOTO 100'DJKB
19 REM'BARG
20 REM *************************'BYBC
21 REM *                       *'BCBY
22 REM * INPUT SUBROUTINE IS   *'BTFG
25 REM *      LINES 40-6       *'BLLG
26 REM *                       *'BCBE
27 REM *************************'BYBJ
29 REM'BARH
40 POKE 198,0'BFXB
41 PRINT"[RVS]["";:FOR X=1 TO LE
   :PRINT" ";:NEXT X:PRINT".]"U$'HNKJ
42 X=1:C$="":PRINT TAB(X)U$
   :FOR X=1 TO LE+1'IQEL
43 IF X<1 THEN X=1'EESG
45 GET Q$:IF Q$=""THEN 45'EHSJ
47 IF POS(0)<1 THEN PRINT"[RVS]
   ["TAB(X)'GGWM
48 IF Q$=CHR$(13)THEN FOR Y=0 TO LE-X
   :PRINT CHR$(18)CHR$(32);:NEXT Y
   :X=LE:GOTO 57'OFMX
```

Continued on pg. 128

BY MARK JORDAN

The 128 Mode

Tabula Rasa

Explore the Commodore 128 in its powerful native mode. Some of the articles in this column may be technical, some not so technical—but we guarantee that they will spark your creativity.

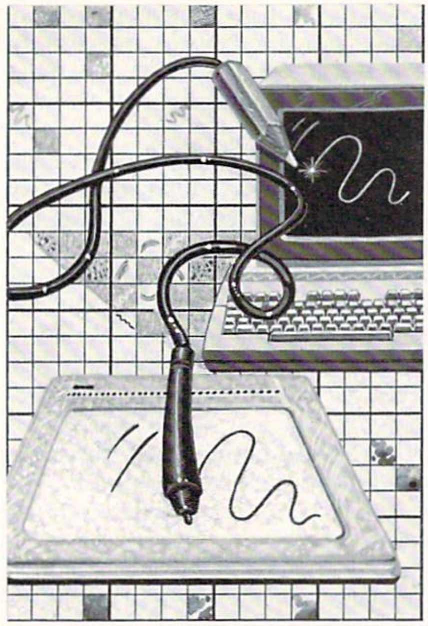
One peripheral that many 128 owners have is a touch tablet, most likely a Koala Pad. Unfortunately, a lot of users think of the pad as an accessory to the paint program that came with it. Actually, it should be the other way around. This month's program uses a touch tablet as an input device for a drawing program—with several twists.

For example, how would you like to create cursive writing for title screens in your programs—maybe even with an on-screen hand doing instant replays of the writing? Or how about designing sprites with your touch tablet? And not just one at a time, but all eight? What about line drawings with twinkling stars or glowing electrons tracing the perimeter?

Listing 1, entitled Tabula Rasa (which means blank slate) does all of the above and more. This program demonstrates BASIC 7.0's useful POT( ) command. It also shows off the drawing features of the 128 in a way that is quite unique—via an array. And once again, the fabulous graphics commands, SPRSAV, SPRDEF and SSHAPE/GSHAPE, are put to strong use.

If you don't have a touch tablet, borrow one. Once you see how easily the 128 can put it to use, you'll probably want to buy one.

Begin, as always, by typing. You must type in both listing 1 and 4. Listing 4 is the sprite data that creates the hand that will become your drawing device. Listings 2 and 3 are optional demos. Use the magazine entry program (in the back of this issue) to help you catch your typos. Listing 4 must be run once before the other three because it saves sprite data that the other programs need. So run it first of all.



ED SAUK

Using Tabula Rasa

Tabula Rasa was designed to be as user-friendly as possible, given the limitations of magazine program lengths. After running it, the only time you'll need to take your hands off the tablet is to load previously-saved files. Everything else is handled via the pad. You'll see your options on the bottom screen line. Simply move your pointer to the option you desire and press either button.

You must plug your tablet into port 2 to use Tabula Rasa. The first options you are given are to draw on full screen, load a file, or draw a sprite. The difference between option 1 and 3 is significant. If you choose 3, you'll be able to draw with your pad on the full screen (almost—since the Koala pad reads only a 255 by 255 grid, you won't be able to draw on quite the entire screen).

To understand what the sprite option does, you probably should simply run the program. Describing it is much more tedious than using it. In general, this option allows you to draw sprites in groups or as a single sprite. Group drawing is nice when you want to design a giant sprite. Two group layouts are allowed: one is 4 sprites across by 2 sprites down and the other is 2 sprites across by 4 sprites down. Thus you can draw giant horizontal sprites or giant verticle sprites. You'll note as you use either of these layouts that your drawing will be twice as big as the actual sprite sizes, enabling much finer control over your creations. When you leave the drawing mode, they will be reduced accordingly.

The single sprite option is great for doing things like creating cursive sprite letters. Your drawing grid for single sprites is eight times an actual sprite size (just as SPRDEF's grid is). Just draw a big cursive A or B (or whatever), and let the program reduce it to actual sprite size.

Sprite creation is an art form. If you've been stuck using the keyboard to create yours, you'll find this drawing method a handy and liberating alternative. What makes this technique of sprite designing really go is that after you've finished drawing a sprite, you can edit it with SPRDEF. Line 435 jumps you into SPRDEF if you so desire. Thus you get the natural drawing motion of the touch tablet for creation, coupled with the editing ease of the keyboard—a nice combination indeed.

Don't take my word for it. Just try it. Follow the prompts. It's easy and fun.

The third of the initial options is to load a file. Since Tabula Rasa allows you to save drawing files, it certainly should allow you to load them back. When you choose this, the screen will list only those files that you've saved using Tabula Rasa. You simply cursor to the one of choice, press RETURN, and let'er load.

Drawing Tips

No matter which of the three options you choose—drawing, loading or sprite-drawing—you'll eventually wind up with your drawing screen in place. You're ready to draw. A few words of wisdom are in order. First, use consistent pressure as you draw. Occasionally, if you let up just a little (but not completely), the line you're drawing will jump. This appears to be a quirk in the Koala Pad (maybe just mine). A few extra IF-THENs in the drawing routine (lines 180-240) could solve this, but it would slow the program considerably.

Another pointer—try to draw with a consistent speed, especially if you want to use some of the screen-writing tricks demonstrated in Listing 2. When you enter the next mode—action viewing (you'll love this)—you'll see the advantage of drawing with a consistent speed.

As you will discover, your pen won't draw until you press the button (either one). Release the button before lifting your stylus.

Here's a trick I use. Cut a piece of paper to fit into your touch tablet's drawing

surface, then pencil-draw on it and get it the way you want it. Now put the paper on the pad and trace it (you may want to tape it down). You can even use this trick to cut pictures first from magazines, then transfer to your monitor screen.

Don't be afraid to make mistakes. A clear-screen option is always available.

Action Viewing

Once you exit the drawing mode (just point and click), you'll get to an instant replay of your drawing on the screen. A sprite that looks like a human hand with a pen will do the honors. This phase is fun.

You're given three options here: dots, lines or sprites. The sprites option will be discussed later. Dots will simply be a follow-the-dots pattern of your drawing. The dots you see are the coordinates that two arrays—X( ) and Y( )—hold. For example, if you drew a simple straight line from location 10-10 (X is first) to location 20-10 you may find that the computer only picked up four plot points.

Let's say they were 10-10, 14-10, 17-10, and 20-10. These four sets of coordinates are what will get saved if you save your drawing. They are also the jumps your drawing will make as it is action-viewed. As you can see, it is best if these coordinates are about equidistant apart. That's where the consistent drawing speed mentioned above comes into play.

The other way of viewing your drawing, the lines option, simply draws from point to point. Instead of dots you get the complete, continuous drawing.

The lines option is best for viewing; the dots option is useful for editing. Yes, that's right, you can edit your drawings. It isn't the easiest thing, but here's the general procedure.

Choose the edit option after viewing. Then move your pointer to any dot (the drawing must be in dot pattern) that you'd like to move and click. Next, move your pointer to where you liked it to be and click again. This doesn't sound that difficult, but due to the slowness of BASIC it is a little tricky. Also, if your dots are tightly packed, it's extremely tricky. But the option is there and it will get the wildly errant dot.

You also can go back and add to your drawing, clear your drawing, watch it again, or save it. Saving is a matter of simply following the prompts. Please note—all files saved will be prefixed with dr. to separate them from other files on the disk. Don't type the dr.; the computer will do it for you.

Had you chosen the sprite option from the view mode, you would have watched your drawing redraw itself to scale. Once that is done, you can edit it with SPRDEF, save it as a sprite file, redo entirely, edit the big drawing, or quit the program. The SPRDEF option is the only one that needs more explanation.

If you chose SPRDEF, you find yourself staring at the SPRDEF grid with the "Which sprite?" prompt staring you in the face. If you're editing a single sprite, press 2 and there it will be. You can now use all the features of SPRDEF (see your system guide) to fine-tune your sprite. Keep in mind that you can move the sprite from slot 1 to any other slot with the copy feature. Just press C to activate. You can design eight sprites singly by designing, moving via copy, exiting SPRDEF, then following prompts to start all over again.

If you choose the save option, your file will be prefixed with sp. prefix.

There. Now, before you do any more reading, you better type it in and use it. After having used it, you'll be teeming with ideas how to work your drawing files into your own programs.

Gimme an X, Gimme a Y

You've seen how Tabula Rasa puts the SPRDEF command to good use. Now let's see how POT( ) works.

With the 64, reading the Koala Pad required peeking some memory locations. With the 128, you simply read POT( ). If you put a 1 or 3 in the parentheses, you'll discover the horizontal position of the stylus on the tablet. On the Koala Pad, if there is no pressure on the tablet, the number 6 will result. Putting a 2 or 4 into the parentheses yields the verticle position of the stylus.

The subroutine beginning at line 735 moves sprite 1 (our cursor) to and fro until a button is pressed. Then line 740 shoots program flow out of the loop and back to where it originated.

If the button has been pressed, POT( ) will simply add 256 to its value. Therefore, if you are pressing your stylus at coordinates 20-20 on the pad and pressing the button at the same time, a read of POT(3) will yield 276. Line 730 strips the button value from X to move the cursor-sprite—MOVSPR 1,(X AND 255). It's all extremely convenient.

Line 415 shows how SSHAPE and SPRSAV are used to convert your drawings to sprites. The shapes are saved as variable A$ in grids exactly 24 X 21 pixels (the arrays LX() and LY() hold the proper values —see line 130), then are simply SPRSAVed from A$ to a sprite number, one through eight.

I've sung the praises of SPRSAV in previous columns, so I won't bore you again here. But I must say, SPRSAV is maybe the most powerful of all the 128's graphics commands.

The Demo Programs

Listing 2 simply demonstrates some novel effects once you've saved a sprite file or two. To use it, you must not only type it in, you also need to run Tabula Rasa once and save a program. A directory listing your just-saved drawing files will print. You must input the one you want to try this demo out on.

This demo not only does instant-replay writing, it also shows a sprite, a twinkling sprite, tracing the writing. It's a very striking effect, one that you may want to use on title screens and even VCR productions. And finally, it shows the twinkling effect without the trace.

You can use this demo in your programs as a giant subroutine. You'll need to renumber the entire listing to fit in your program. All the variables in the program are two-letter variables, the first letter being U. They are listed in line 5. Be sure your main program doesn't use any of these variables.

You'll need to provide the user with a return from this subroutine. Simply remove the REM from line 370 and change line 320 to read "...IF UA$ <>" "THEN EXIT".

Listing 3, the second demo program, shows an unusual worm-like animation of whatever drawing file you load in. As with listing 2, you'll need to draw and save at least one file before you can try this one out.

I wish I had more space to tell you about other interesting effects you can use with your drawing files. Since the coordinates are in an array, they are very easy to use for myriads of special effects. Lines 260-410 would be useful for study in how the twinkling, tracing effect works.

In a future issue I will publish a game that uses the touch tablet as an input device. Until then—En garde! Draw! ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Listing 1 Tabula Rasa

```
10 BLOAD"SP.HAND"'BBCA
15 C=Ø:EN=Ø:I=Ø:LY=Ø:M=Ø:OB=Ø:OX=Ø
   :OY=Ø:T=Ø:W=Ø:X=Ø:X1=Ø:Y=Ø:Y1=Ø
   :SC=1:Z=Ø:LF=Ø:P3=Ø:P4=Ø'TRUG
20 A$="":D$="":DD$="":DR$="":ES$=""
   :F$="":HA$="":LY$="":M$="":X$=""
   :B1=Ø:B2=Ø:B3=Ø:B4=Ø'OABS
25 DIM LX(2,8),LY(2,8),X(4ØØØ),
   Y(4ØØØ)'BGBJ
3Ø COLOR Ø,1:COLOR 4,12:GRAPHIC 1,1
   :COLOR 1,16'ERBF
35 LY=Ø:M=Ø:B1=32:B2=2:B3=288:B4=19Ø
   :Z=Ø'HFLP
4Ø SPRITE 1,1,15:MOVSPR 1,16Ø,1ØØ'CSUF
45 CHAR 1,Ø,24," DRAW ON PAD
   : LOAD FILE :[SPACE2]DRAW SPRITE ",
   1'BJSR
5Ø LF=Ø:GOSUB 735:IF X<79 THEN
   11Ø'FOHH
55 IF X<175 THEN GOSUB 61Ø:LF=1
   :GOTO 25Ø'GPHN
6Ø :'ABHC
65 FOR T=Ø TO 3:BOX 1,T*24+1Ø,2,
   T*24+34,23:BOX 1,T*24+1Ø,23,
   T*24+34,44'NRKY
7Ø BOX 1,26,T*21+66,5Ø,T*21+87
   :BOX 1,5Ø,T*21+66,74,T*21+87
   :NEXT'LPBT
75 BOX 1,12Ø,2,312,17Ø'BPFL
8Ø CHAR 1,2,1,"1":CHAR 1,4,9,"2"
   :CHAR 1,16,2,"3"'DVCL
85 CHAR 1,Ø,24," LAYOUT #1
   : LAYOUT #2 : ONE SPRITE #3[SPACE2]
   ",1'BJLU
9Ø GOSUB 735'BDSG
95 LY=3:IF X<159 THEN LY=2'FLPQ
1ØØ IF X<63 THEN LY=1'EGUY
1Ø5 :'ABHA
11Ø IF LY=1 THEN B1=65:B2=62:B3=257
    :B4=146'HYOG
115 IF LY=2 THEN B1=112:B2=8:B3=21Ø
    :B4=176'HYAL
12Ø IF LY=3 THEN B1=64:B2=1Ø:B3=258
    :B4=18Ø'HYHH
125 RESTORE 13Ø:FOR I=1 TO 2
    :FOR T=1 TO 8'HLUI
13Ø READ LX(I,T),LY(I,T):NEXT
    :NEXT'DRRD
135 DATA 118,111,142,111,166,111,19Ø,
    111,118,132,142,132,166,132,19Ø,
    132'BNNP
14Ø DATA 142,84,166,84,142,1Ø5,166,
    1Ø5,142,126,166,126,142,147,166,
    147'BLJL
145 IF LF=1 THEN 38Ø'DGPH
15Ø :'ABHA
155 SPRITE 1,1,15:MOVSPR 1,319,8Ø'CRPJ
16Ø GRAPHIC 1,SC:COLOR 1,16'CJGE
165 CHAR 1,Ø,24,"[SPACE3]
    EXIT DRAW MODE[SPACE2]
    :[SPACE3]CLEAR SCREEN[SPACE5]",
    1'BJQR
17Ø BOX 1,B1,B2,B3,B4:SC=1'CRUH
175 :'ABHH
18Ø DO:OX=X+28:OY=Y'EKOI
185 X=POT(3):Y=POT(4):IF X=262 OR
    Y=262 THEN 185'JXAS
19Ø MOVSPR 1,(X AND 255)+51,Y+32'EPXJ
195 IF X<256 AND Y<256 THEN BEGIN'GJVP
2ØØ :IF OB=1 THEN X(Z)=Ø:OB=Ø
    :Z=Z+1'HRLE
2Ø5 :BEND:GOTO 24Ø'CGTD
21Ø X=X AND 255:Y=Y AND 255:OB=1'FPRE
215 IF Y>19Ø THEN BEGIN'EFKF
22Ø IF X<13Ø THEN EN=Z:EXIT'FIAD
225 BEND:Z=Ø:EXIT'DFEG
23Ø DRAW 1,OX,OY TO X+28,Y'DMGE
235 X(Z)=X:Y(Z)=Y:Z=Z+1'EPIK
```

```
240 LOOP:IF Z=0 THEN 160'EGRE
245 :'ABHF
250 SCNCLR'BAGB
255 CHAR 1,0,24,"[SPACE3]DOT PATTERN
    : LINE PATTERN : SPRITE[SPACE2]",
    1'BJES
260 X$="":GOSUB 735:IF X<95 THEN
    X$="DOT":GOTO 270'HQLK
265 IF X>214 THEN 375'DHMK
270 FOR C=0 TO EN-1'EFJG
275 IF X(C)=0 THEN 305'DIBL
280 MOVSPR 1,X(C)+51,Y(C)+32'DQHJ
285 IF X$="DOT" THEN DRAW 1,X(C)+28,
    Y(C):GOTO 300'GTAR
290 IF X(C+1)=0 THEN 300'EJJJ
295 DRAW 1,X(C)+28,Y(C) TO X(C+1)+28,
    Y(C+1)'GBFT
300 OX=X(C):OY=Y(C)'CNWB
305 NEXT'BAEC
310 :'ABHX
315 CHAR 1,0,24,"[SPACE4]ADD : EDIT
    : CLEAR : WATCH : SAVE[SPACE3]",
    1'BJAO
320 GOSUB 735:IF X<40 THEN SC=0
    :GOTO 160'GOQF
325 IF X< 95 THEN GOSUB 485
    :GOTO 315'FKCJ
330 IF X<159 THEN 30'DGMD
335 IF X<223 THEN 250'DHGI
340 GRAPHIC 0,1:PRINT CHR$(14)'DILE
345 INPUT"FILENAME";F$'BDOJ
350 DOPEN#2,"DR."+LEFT$(F$,13),W'DNVH
355 FOR C=0 TO EN'DEUJ
360 : PRINT#2,CHR$(X(C));CHR$(Y(C));
    :NEXT'ESGJ
365 CLOSE 2:GRAPHIC 1:GOTO 315'DHSL
370 :'ABHE
375 IF LY=0 THEN 65'DFKM
380 SPRSAV 1,HA$:SCNCLR'CHNI
385 M=2:IF LY=3 THEN M=8'FISP
390 FOR C=0 TO EN:IF X(C)=0 OR
    X(C+1)=0 THEN 405'JTJQ
395 X=X(C)/M+100:Y=Y(C)/M+80
    :X1=X(C+1)/M+100:Y1=Y(C+1)
    /M+80'OQKF
400 DRAW 1,X,Y TO X1,Y1'CKCC
405 NEXT'BAED
410 IF M=8 THEN SSHAPE A$,104,81,127,
    101:SPRSAV A$,2:GOTO 420'GEUI
415 FOR T=1 TO 8:SSHAPE A$,LX(LY,T),
    LY(LY,T),LX(LY,T)+23,LY(LY,T)+20
    :SPRSAV A$,T:NEXT'IDIW
420 SPRSAV 1,A$'BFNB
425 SPRSAV HA$,1:CHAR 1,0,24,"[SPACE3]
    SPRDEF : SAVE : REDO : EDIT
    : QUIT[SPACE3]",1'CQOT
430 GOSUB 735:SPRSAV A$,1'CJJE
435 IF X<56 THEN SPRDEF:SPRITE 1,1,15
    :GRAPHIC 1:GOTO 475'HSFO
440 IF X<112 THEN BEGIN'EFFF
445 GRAPHIC 0,1:INPUT"FILENAME";
    F$'CHYM
450 BEND:PRINT"[CLEAR,SHFT S]AVING "F$
    :BSAVE"SP."+LEFT$(F$,13),B0,
    P3584 TO P4096:GRAPHIC 1
    :GOTO 475'IIST
455 SPRSAV HA$,1'BGEK
460 IF X<168 THEN SC=1:GOTO 30'FKWJ
465 IF X<223 THEN 250'DHGM
470 IF X>222 THEN GRAPHIC 0,1:END'FIUJ
475 GOTO 425'BDKL
480 :'ABHG
485 IF X$<>"DOT"THEN X$="DOT":SCNCLR
    :GOTO 270'HJUT
490 M=0:CHAR 1,0,24,"CLICK DOT TO
    MOVE : CLICK HERE TO EXIT. ",
    1'CMMV
495 DO:X=POT(3):Y=POT(4)'FMDS
500 IF X>255 OR Y>255 THEN EXIT'GIAF
505 MOVSPR 1,(X AND 255)+51,Y+32'EPXJ
510 LOOP'BAKA
515 IF POT(3)>255 OR POT(4)>255 THEN
    515'HRQM
520 X=X AND 255:Y=Y AND 255'ELYG
525 IF Y>190 THEN BEGIN
    :IF X>122 THEN 600'HNON
530 BEND:GOTO 495'CFXE
535 IF M=1 THEN 585'DFEK
540 FOR T=X-2 TO X+2:FOR I=Y-2 TO
    Y+2'KLNM
545 LOCATE T+28,I'CFTK
550 IF RDOT(2)=1 THEN X=T:Y=I
    :GOTO 565'HNHL
555 NEXT:NEXT'CBLK
560 GOTO 495'BDRG
565 CHAR 1,0,24,"[SPACE12]
    LOCATE AND CLICK[SPACE12]",1'BJXT
570 FOR T=0 TO EN:IF X(T)=X AND
    Y(T)=Y THEN 580'ISGP
575 NEXT'BAEL
580 X1=T:M=1:DRAW 0,X+28,Y
    :GOTO 495'FSBO
585 X(X1)=X:Y(X1)=Y:DRAW 1,X+28,Y'EVHU
590 X(X1)=X:Y(X1)=Y:DRAW 1,X+28,Y'EVHQ
595 GOTO 490'BDMO
600 RETURN'BAQA
605 :'ABHF
610 GRAPHIC 0,1:ESC$=CHR$(27)'DMOF
615 PRINT"[CLEAR]"SPC(7)ESC$"T";'CHSJ
620 DR$="[BLUE,RVS]---->[LEFT5,RVOFF,
    GRAY3]"'BDQI
625 DD$="[RVOFF,SPACE5,LEFT5]"'BDQM
630 TRAP 635:DIRECTORY"DR.*"'CERG
635 PRINT"[LEFT,UP]"ESC$"B";'BFTL
640 PRINT"[HOME,DOWN]"ESC$"T";'BFAG
645 PRINT ESC$"M";'BFHL
650 PRINT DR$;'BEQG
655 DO:GET KEY A$:IF ASC(A$)=13 THEN
    EXIT'IKPS
660 PRINT DD$:PRINT DR$;:GOTO 650'DMGK
665 LOOP'BAKL
670 PRINT SPC(21)ESC$"@"ESC$"J"ESC$"L
    "SPC(3);'DSVN
675 POKE 208,1:POKE 842,13'CMPP
```

```
680 INPUT F$'BCNI
685 PRINT"[HOME2,CLEAR]";'BBQO
690 TRAP'BAOJ
695 DOPEN#2,(F$):C=0'CLPR
700 GET#2,A$:X(C)=ASC(A$)'DOSF
705 GET#2,A$:Y(C)=ASC(A$)'DOTK
710 IF ST>0 THEN 720'DGHF
715 C=C+1:GOTO 700'DHIK
720 EN=C-1:Z=EN:DCLOSE'EKGI
725 GRAPHIC 1:RETURN'CCOJ
730 :'ABHE
735 DO:X=POT(3):Y=POT(4)'FMDP
740 IF X>255 OR Y>255 AND (Y AND
    255)>190 THEN EXIT'JRJP
745 IF Y>200 THEN Y=200'EIGO
750 MOVSPR 1,(X AND 255)+51,Y+32'EPXL
755 LOOP'BAKL
760 IF POT(3)>255 OR POT(4)>255 THEN
    760'HRSO
765 RETURN'BAQM
```

END

Listing 2 Optional Demo

```
5 UA=0:UD=0:UN=0:UT=0:UA$="":UB$=""
  :UF$="":UH$=""'IGKQ
10 COLOR 0,1:COLOR 4,12'CIMA
20 BLOAD"SP.HAND"'BBCB
30 DIM UX(4000),UY(4000)'BRED
40 DIRECTORY"DR.*"'BAXB
50 INPUT"[DOWN]FILENAME (OMIT [RVS]
   DR.[RVOFF]) ";UF$'BECI
60 DOPEN#2,"DR."+UF$:UC=0'DLLH
70 GET#2,UA$:UX(UC)=ASC(UA$)'DSVJ
80 GET#2,UB$:UY(UC)=ASC(UB$)'DSYK
90 IF ST>0 THEN 110'DGAI
100 UC=UC+1:GOTO 70'DIFX
110 UN=UC-1:DCLOSE'DHQA
120 :'ABHW
130 FAST'BBJY
140 :DIM UW$(8)'BHZB
150 GOSUB 480'BDPB
160 :'ABHB
170 FOR UT=1 TO 8:SPRITE UT,0:NEXT
    :SLOW'GNUJ
180 GRAPHIC 1,1:SPRITE 1,1,7
    :SPRSAV 1,UH$'DRIJ
190 COLOR 0,1:COLOR 1,7'CHPH
200 FOR UC=0 TO UN-1'EGEA
210 IF UX(UC)=0 OR UX(UC+1)=0 THEN
    240'GSQF
220 MOVSPR 1,UX(UC)+53,UY(UC)+32'DUSE
230 DRAW 1,UX(UC)+30,UY(UC) TO
    UX(UC+1)+30,UY(UC+1)'GJDL
240 NEXT'BAEA
250 REM ----- START TWINKLING'BTFG
260 GRAPHIC 1:FOR UT=0 TO 6
    :SPRSAV UW$(UT),UT+1:NEXT'HUDL
270 CHAR 1,0,23,"[SPACE6]
    PRESS R FOR RANDOM TWINKLING
    [SPACE6]",1'BJUO
280 CHAR 1,0,24,"[SPACE4]
    PRESS C FOR CONTINUOUS TWINKLING
    [SPACE4]",1'BJSQ
290 SPRITE 1,1,2:MOVSPR 1,UX(1)+44,
    UY(1):UC=1'ECVN
300 DO'BAJW
310 FOR UA=0 TO 7'DELA
320 GET UA$:IF UA$<>"" THEN UB$=UA$
    :REM CHANGE TO 'THEN EXIT' AND
    REMOVE REM FROM LINE 380'HFFS
330 UD=1:IF UB$="R" THEN
    UC=INT(RND(1)*UN):UD=0'JUGL
340 GOSUB 390'BDPC
350 NEXT'BAEC
360 LOOP'BAKD
370 REM SPRSAV UH$,1:RETURN'BSPJ
380 :'ABHF
390 FOR UT=0 TO 6:GOSUB 430:NEXT'FJAL
400 FOR UT=6 TO 0 STEP-1:GOSUB 430
    :NEXT'HKHE
410 RETURN'BAQY
420 :'ABHA
430 POKE 8184,UT+56:IF UX(UC)=0 THEN
    450'FUKI
440 MOVSPR 1,UX(UC)+44,UY(UC)+40'DURI
450 UC=UC+UD:IF UC>UN THEN UC=0'GOVK
460 FOR UA=1 TO 5:NEXT:RETURN'FGLI
470 REM ----- TWINKLES'BNYI
480 GRAPHIC 1,1:COLOR 1,15'CIEJ
490 FOR UT=0 TO 6'DEEJ
500 :SSHAPE UW$(UT),0,0,20,22'BSOD
510 : ON UT+1 GOSUB 580,580,570,570,
    550,550'DCSH
520 NEXT'BAEB
530 RETURN'BAQC
540 :'ABHD
550 WIDTH 1:DRAW 1,12-UT,10 TO 9+UT,
    10'FSYL
560 WIDTH 1:DRAW 1,10,12-UT TO 11,
    8+UT'FSYM
570 WIDTH 2:DRAW 1,11-UT,
     9+UT TO  9+UT,11-UT'HVVQ
580 WIDTH 2:DRAW 1,10-UT,
    10-UT TO 10+UT,10+UT'HXYR
590 RETURN'BAQI
```

END

Listing 3 Optional Demo

```
10 COLOR 0,1:COLOR 4,12
   :PRINT"[CLEAR]"'DJPB
20 DIM UX(4000),UY(4000)'BREC
30 DIRECTORY"DR.*"'BAXA
40 INPUT"[DOWN]FILENAME (OMIT [RVS]
   DR.[RVOFF]) ";UF$'BECH
50 DOPEN#2,"DR."+UF$:UC=0'DLLG
60 GET#2,UA$:UX(UC)=ASC(UA$)'DSVI
70 GET#2,UB$:UY(UC)=ASC(UB$)'DSYJ
80 IF ST>0 THEN 100'DGYH
90 UC=UC+1:GOTO 60'DIEI
100 UN=UC-1:DCLOSE'DHQY
110 :'ABHV
```

Continued on pg. 120

BY THOMAS D. GARCHOW

Using KoalaPainter Files *on the Commodore 128*

Load and display KoalaPainter *picture files while in 128 mode.*

In a the August/September, 1986, issue of *Commodore Power/Play*, there was an article entitled "Saving and Loading the Commodore 128 Graphics Bit Map." In it, Morton Kevelson explains how images created with 64 graphics packages can be used on the 128. This article gave me the incentive to experiment with methods for transferring my *KoalaPainter* picture files to the 128 graphics screen, and here I present a technique to load and display *KoalaPainter* picture files while in 128 mode. It will never be necessary to load the *KoalaPainter* program itself—we will work only with the picture. After the picture has been saved for 128 use, it can be loaded and displayed in about five seconds.

The technique itself is rather simple. Basically, we will load the picture file into its 64 locations, save the picture data to disk, then load the information into the 128's graphics area.

How It Works

When a *KoalaPainter* picture file is loaded on the 64, it takes up residence at locations 24576-34575. The bit map itself occupies locations 24576-32575. Screen memory, which supplies the high-resolution color, resides at locations 32576-33575. Color RAM, which allows for multicolor displays, is loaded in from 33576-34575.

To use this data on the 128, we will utilize the format suggested in Kevelson's article—namely, we will split this data into two separate files. The first file will be a combination of the bit map and screen memory. It will therefore include the data which is now stored in memory from location 24576 to location 33575. The second file will consist of color RAM only. Once these two files are saved, we can load them into the 128 at whatever location we wish.

The first file is the more difficult of the two to save. As you can see, *KoalaPainter* saves its picture files with the bitmap values first; screen memory values are stored behind them. The 128 expects to find screen memory values from 7168-8167, 1K before the bitmap values begin at 8192. Also, *KoalaPainter*'s screen memory values do not begin on an even 1K boundary. These two facts make it impossible for us to load the file directly into the 128. These problems can both be solved by using the 128's built-in monitor to relocate the data before we save it.

The second file is no problem: It can be saved directly. It, however, is slightly more difficult to load.

Procedure

To save files to disk so they can be used by the 128, you must perform the following.

1. Turn on the computer in 128 mode.
2. Put a disk that contains a *KoalaPainter* picture file into the drive.
3. Type BANK 0 and hit RETURN. If you don't do this, the picture file will collide with BASIC ROM.
4. Press F3 to display the disk directory.
5. Cursor up to the line which contains the name of the picture file you wish to load.
6. Type LOAD. Cursor across to the end of the file name and type ,8,1 and hit RETURN. Wait for the READY prompt.
7. Cursor down past the bottom of the directory. Do not be concerned about the orange character colors.
8. Press F8 to enter the monitor.
9. Type T 07F40 08327 05C00 and hit RETURN. This will transfer the screen memory values which now occupy locations 32576-33575 to location 23552, 1K in front of the bitmap.
10. Type S"Programname" ,8, 05C00,07F40 and hit RETURN. This will save the first file to disk.
11. Type S"Programname.CM",8, 08328,08710 and hit RETURN. This will save the color RAM values to disk.
12. Type X and hit RETURN. This exits the monitor.
13. Type BANK 15 and hit RETURN.

The two files are now on disk in a form which can be used by the 128 computer. The procedure seems long, because it is composed of several parts. In actuality, the entire process takes roughly two minutes.

Program

The program gives an example of how to load these files into the 128. The procedure is quick and painless. Again, this is a variation of the techniques used in Kevelson's article.

You may have noticed that no reference was made in the article to the border and background colors of the original picture. These are saved by *KoalaPainter* at address 34576, and we did not include this data in either of our picture files. The reason for omitting them is to allow the user to easily alter these parameters with his or her own loader program. You can display your graphics on any background you wish. ▣

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Listing 1

```
10 FAST'BBJX
20 BANK 0'BCWY
30 GRAPHIC 3,1:COLOR 0,1
   :COLOR 4,1'DLFD
40 BLOAD"FRACTALUS",B0,P7168'BKWF
50 BANK 15'BDBC
60 POKE 53274,PEEK(53274)AND 254'DQQH
70 POKE 1,PEEK(1)AND 254'DIEG
80 BLOAD"FRACTALUS.CM",B15,P55296'BMQK
90 POKE 1,PEEK(1)OR 1'DGZI
100 POKE 53274,PEEK(53274)OR 1'DORY
110 SLOW'BBKW
120 SLEEP 10'BDFX
130 GRAPHIC 0'BBOY
```

END

Continued from pg. 22

But these minor faults will only irritate the most critical eye. The alluring flavor of the sailing duel has been skillfully captured by Mindscape, with most of the rules and principles of the regatta incorporated to provide a highly realistic sailing experience. I particularly enjoyed the built-in communications option that allows long distance opponents to race head-to-head via modem. Now, not even a dry, solid mass as large as a continent can keep two captains from sailing together across the privacy of Silicon Bay.

Whether you're out to give the Aussie's revenge or just looking to pick up some sailing basics, with the arrival of *The American Challenge*, your ship has come in. ■

Getting Your Feet Wet

If this is your first time in the Captain's chair of a sailboat, I turn your attention to *The American Challenge* user's manual. Every page of this booklet has at least one instructional tip to help you along. Invest some time in looking it over. Then, once you feel comfortable in your new deck shoes, check out the hints I've listed below. They just might keep some of you novice skippers from getting in over your head.

Any time you enter a race, you will be matched against the run of the last winning boat. Inexperienced sailors out on an early excursion might find it advantageous to play follow-the-leader. By hanging back and mirroring the moves of the reigning champ, you are sure to pick up some valuable sailing tips and strategies. Then, later on, you can show just how quickly you learn by beating your teacher with some of his own tricks.

To check on each ship's position and progress at any point during the race, the skipper has the option of switching to an alternate screen which offers a bird's eye view of the bay course. Not only is this screen a good navigational tool, but it's also a nice place to catch a breather, for it puts all the racing action on hold. Whenever you're uncertain or confused about a strategy decision or ship operation, immediately switch to this overhead perspective. This will stop the clock, as well as your opponent, allotting you all the time you need to resolve your problem.

In accordance with Mindscape's advice, my experience has found the cockpit style position directly behind the boat to present the best point of view for skipper and spectator alike. Shifting the perspective to the side or front will only act to confuse the novice sailor.

In the last few races, Mindscape increases the sailing challenge by removing the compass from the ship's instrument panel. Captains are then required to use landmarks to check their position. The Bay Map on page 45 of the manual will be of immeasurable assistance. If you ever get lost and become uncertain about where you're headed, switch up to the overhead view to stop the clock and re-establish your bearings.

From my observations, I have found the centerboard to be the keyboard captain's most misused and forgotten racing weapon. Remember, when you're sailing downwind, raise the centerboard to increase your ship's speed. But don't forget to drop it down again when heading into the wind or you will be pushed from side to side and slip off course. ■

ADVENTURE ROAD

Continued from pg. 47

It's the most replayable adventure because there are actually four games, each a variation on the main theme. They take place in the same castle and with the same people, but the purpose of the objects and the solutions to the goals differ in each version. Also varying in difficulty, they're color-coded, and you choose one by naming your favorite color (red, green, yellow or blue) at the beginning.

Written by Stu Galley and Jim Lawrence, who also collaborated on *Seastalker*, the prose and dialogue are professionally crafted. The castle's creaky doors, cobwebs and eerie sounds underline the suspense as you investigate the castle's secret passageway, and each character shows off a distinct personality.

And for the first time in an Infocom game, the game text does not name everything in the room when you examine or search it. This is part of the game's copy-protection. An accompanying travel brochure provides a map of the castle and describes all the items in each location. Without it, you won't be able to finish the game because you'll never find certain items. One advantage is that you don't have to draw a map, since the one in the brochure suffices for all but the secret passage. (The packaging also includes a *Moonmist* T-shirt iron-on). *Moonmist* is an entertaining story that disk drive detectives will enjoy.

News

Wizardry, the legendary role-playing game, is finally being released for the 64 and Amiga. It's a hard-core swords-and-sorcery scenario set in a multi-level maze.

Infocom is no longer labelling their games as science fiction, fantasy, and so on. Instead, they are putting the author's name on the cover. They're also dropping difficulty levels on the packaging, unless one happens to be as hard as *Spellbreaker*.

All three games in the *Enchanter* series have been packaged as a $69.95 set. The *Zork* trilogy has been similarly packaged, as have the first three *Ultimas*.

In *Star Trek II: The Promethean Prophecy*, you meet an alien culture never visited by Federation forces and unearth a secret prophecy. It's an all-text game for the 64. *Alternate Reality, The Dungeon* is out for 64. And the first game in the series *The City* is available for the Amiga.

Watch out for *Portal*. Activision calls it a "computer novel," but there are no puzzles—just a series of files to read. Cute interface, but no adventure. ■

Tips of the Month

The Pawn: If you can't get the Guru to stop laughing, use something to cover the wristband. Don't bother fiddling with the stump until you've given the Guru what he wants. You'll need to get past the boulder to do so—which involves using the same thing you used on the wristband with a pair of things from the shed near the castle.

Tass Times in Tonetown: Having trouble with the Eye? Look in the forest for something to throw at it. Then you can enter the gate, but not from this location. You'll need to go through the tunnel under the well. Now you need a light source? Try Fast Eddies.

Phantasie I: Can't get in Dungeon H? Add a Minotaur to your party. ■

BY TIM JONES

AmigaBASIC Tutorial

You're starting an amazing graphics space adventure in AmigaBASIC and you plan on utilizing Bobs and Sprites to make life easier on yourself. You've dug out the AmigaBASIC documentation and are now thoroughly confused as to how the OBJECT.XXX calls work. You decide that you'll take the advice of the manual and design your objects using the ObjEdit editor program that was supplied with your AmigaBASIC/EXTRAS disk.

Now that you've designed your objects, you must write the routines that will open the various object files and read the data into strings to be used by the OBJECT.SHAPE command. Everything seems to be working fine.

Well, you package your game up and deliver it to a friend for testing. The first thing he notices is the HUGE number of files that are required to make the program work. If only you could have deciphered what was required by the OBJECT.SHAPE command so you could have included the shape data in DATA statements in your program. You could have made things much simpler and reduced the number of required files to one.

I just lived through a similiar situation and I decided that there must be a simpler way to do things. After researching the Bob and VSprite structures in the ROM KERNAL manual and Sybex's *Amiga Programmer's Handbook*, I took a long hard look at the resulting files created by the ObjEdit program. ObjConvert is the end product of this research.

By first using ObjEdit to create your Bobs and VSprites, you can convert the information in the output files into DATA statements, complete with the appropriate string building commands, into mergible ASCII files that can be merged into your AmigaBASIC program.

The ObjConvert program does all of the work for you, all that is left is for you to assign the resulting data to an appropriate object number.

The following is a discussion of the format of the data created by the ObjEdit program.

Bytes 1-4:
Color Set OFFSET—Currently unused by AmigaBASIC, should always be zeros.

Bytes 5-8:
Data Set Offset—Currently unused by AmigaBASIC, should always be zeros.

Bytes 9-12:
Depth—First three bytes contain zero. Last byte contains number 2-5.

Bytes 13-16:
Width—The width of the object in pixels.

Bytes 17-20:
Height—The height of the object in pixels.

Bytes 21-22:
Flags—Byte 21 is zero
Byte 22 as follows:

Bit 0—VSprite = 1>Set if the object is a VSprite

1 CollisionPlaneIncluded = 2>Not optional in AmigaBASIC. Used to monitor if a collision has occurred. Must be set.

2 ImageShadowIncluded = 4>Used to make the non-drawn areas of the object definition box solid rather than transparent. Not used by AmigaBASIC. Must be set.

3 SAVEBACK = 8>Used to save the background for re-drawing when the Bob or VSprite is moved.

4 OVERLAY = 16>Used in conjunction with bit 2.

5 SAVEBOB = 32>Allows the Bob to act as a paint brush. If set, does not erase old Bob image as Bob is moved.

6-7>Not used by AmigaBASIC.

The values above are additive (i.e. 19 would be a VSprite bits 0,1 & 4 set)

Bytes 23-24:
PlanePick—allows mapping of Bob to different playfield planes to allow color variations. Dependent on screen depth.

Bytes 25-26:
PlaneOnOff—always zero in AmigaBASIC.

Bytes 27—(endofdata-5): (For VSprite)
Imaga Data

Bytes 27—endofdata: (For Bob)
Imaga Data

If the object is a VSprite then the last five bytes contain the color data for that VSprite.

This is a sample file for a simple ball VSprite produced with ObjConvert.

```
'Merge data for VSprite/Bob file Balll
DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H02
DATA &H00,&H00,&H00,&H10,&H00,&H00,&H00,&H0F,&H00,&H19,&H00,&H03
DATA &H00,&H00,&H00,&H00,&H00,&H00,&H1F,&H00,&H7F,&HC0,&HC7,&HE0
DATA &HC7,&HE0,&HFF,&HE0,&H7F,&HC0,&H1F,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00
DATA &H1C,&H00,&H7F,&H00,&HFF,&H80,&HFF,&H80,&HFF,&H80,&H7F,&H00
DATA &H1C,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&HFF,&H00,&H00,&H0F,&H80
FOR BobCnt = 1 TO 92
  READ BobStr%
  Balll$ = Balll$ + CHR$(BobStr%)
NEXT BobCnt
```



All that needs to be added to this is the OBJECT.XXX calls to set the shape, starting X & Y locations, speeds and acceleration velocities (if used).

The most efficient manner in which to act upon this data is to label the first data set and then GOSUB that label early in your program. This will work no matter how many data sets you have as long as you place a RETURN as the last command in the series.

If some of the programming in the source is a bit confusing, hang with us as I will be covering libraries and advanced system programming in upcoming articles. Also, make sure that the file 'graphics.bmap' is in your current directory or the Libs directory on your boot (SYS:) disk. ■

```
'Data maker from files created by the ObjEdit program
'supplied with your AmigaBASIC disk.

'When you merge the data file with your BASIC program, you
'should create an OBJECT.SHAPE # statement and assign the
'string name of the Bob/VSprite created in the DATA file.
'As an example: The Bob is called Ball.
'
'  OBJECT.SHAPE 1,Ball$
'
'This will take care of attaching the shape data to the
'appropriate object

Initialize:

  FALSE = 0 : TRUE = -1
  BobRight = 230 : BobBottom = 90
  DEF FNArraySize& = 3 + INT((BobRight +
           16)/16)*(BobBottom+1)*3
  DECLARE FUNCTION Move LIBRARY
  DECLARE FUNCTION SetDrMd LIBRARY
  LIBRARY "graphics.library"
  Title$ = "VSprite/Bob DATA Maker                    Tim Jones "
  WINDOW 1,Title$,(0,0)-(631,186),0
  PALETTE 0,0,0,0
  PALETTE 3,1,.2,.2
  PALETTE 2,.2,1,.2
  PALETTE 1,.2,.5,1
  Rp& = WINDOW(8)
  DIM J$(12),JH$(12)
Start:
  COLOR 1,0 : CLOSE 1,2
  Counter = 0
  GOSUB NameRequestor
  IF NOT Okay THEN
    CLS : LIBRARY CLOSE
    WINDOW 1,"Basic",(0,0)-(617,186),31,-1 : END
  END IF
  ON ERROR GOTO FileProb
  OPEN FileName$ FOR INPUT AS 1 LEN = 2048
  CLS
  OutFile$ = FileName$ + ".DATA"
  OPEN OutFile$ FOR OUTPUT AS 2 LEN = 2048
  PRINT #2," ' Merge data for VSprite/Bob object
           file ";FileName$
  PRINT #2," ' Created with ObjConvert   Tim Jones 1986"
  PRINT #2," ' Be sure to assign the DATA to the
           OBJECT.SHAPE as described"
  PRINT #2," ' in the AmigaBASIC manual."
  PRINT #2," "

BuildData:

  L& = LOF(1)

  WHILE NOT EOF(1)
    FOR I = 1 TO 12
      IF EOF(1) THEN MakeIt
      J$(I) = INPUT$(1,1)
      JH$(I) = HEX$(ASC(J$(I)))
      IF LEN(JH$(I)) < 2 THEN JH$(I) = "0" + JH$(I)
    NEXT I
 MakeIt:
    IF I < 12 THEN
      Data1$ = "DATA "
      FOR dc = 1 TO I - 2
        Data1$ = Data1$ + "&H" + JH$(dc) + ","
      NEXT dc : Counter = Counter + I - 1
      Data1$ = Data1$ + "&H" +JH$(dc)
      COLOR 2,0
      PRINT Data1$ : PRINT #2,Data1$
      COLOR 1,0
      GOTO MakeFile
    END IF
    Data1$ = "DATA &H"+JH$(1)+",&H"+JH$(2)+
         ",&H"+JH$(3)+",&H"+JH$(4)
    Data1$ = Data1$+",&H"+JH$(5)+",&H"+JH$(6)+
         ",&H"+JH$(7)+",&H"+JH$( 8)
    Data1$ = Data1$+",&H"+JH$(9)+",&H"+JH$(10)+
         ",&H"+JH$(11)+",&H"+JH $(12)
    COLOR 2,0
    PRINT Data1$
    PRINT #2,Data1$ : Counter = Counter + 12
    COLOR 1,0
  WEND
MakeFile:
    PRINT #2," "
    PRINT #2,"FOR BobCnt = 1 TO";STR$(Counter)
    PRINT #2,"  READ BobStr%"
    PRINT #2,"  ";FileName$;"$ = ";FileName$;"$ +
                CHR$(BobStr%)"
    PRINT #2,"NEXT BobCnt"
    PRINT #2," "
    CLOSE 2 : CLOSE 1 : PRINT : PRINT

 Finished:

    Prompt$ = "   Convert another?"
    Prompt2$ = ""
    GOSUB YNRequestor
    IF NOT Okay THEN
      LIBRARY CLOSE
      CLOSE
      WINDOW 1,"Basic",(0,0)-(617,186),31,-1
      END
    END IF
    GOTO Start

 FileProb:

   flag = ERR
   Prompt$ = "   ERROR >> "+STR$(ERR)
   Prompt2$ = " Either to continue"
   GOSUB YNRequestor
   RESUME Start

NameRequestor:

   Size& = FNArraySize&\2
   DIM ScrSav&(Size&)
   GET(40,40)-(230,90),ScrSav&
DrawRequestorToScreen2:
   LINE(40,40)-(230,90),1,bf
   LINE(40,40)-(230,90),0,b
   LINE(44,42)-(226,88),0,b
   LINE(50,74)-(72,86),3,bf
   LINE(50,74)-(72,86),0,b
   LINE(150,74)-(220,86),3,bf
   LINE(150,74)-(220,86),0,b
   CALL Move&(Rp&,53,83)
   COLOR 0,3 : PRINT "OK"
   CALL Move&(Rp&,160,83)
   COLOR 0,3 : PRINT "CANCEL"
   LINE(53,50)-(216,62),3,b
   Curs = 55 : LINE(Curs,52)-(Curs+7,60),2,bf
   CALL Move&(Rp&,53,71) : COLOR 0,1
   PRINT "  Enter File Name"
   C$ = INKEY$ : WHILE C$ <> "" : C$ = INKEY$ : WEND
   FileName$ = ""

AccessLoop:

   I = MOUSE(0) : X = MOUSE(1) : Y = MOUSE(2)
   IF I <> 0 THEN
     WHILE I <> 0 : I = MOUSE(0) : X = MOUSE(1)
             : Y = MOUSE(2) : WEND
     Y=Y-1
     IF X > 150 AND X < 220 AND Y > 74 AND Y < 86 THEN
       CALL SetDrMd&(Rp&,2) : LINE(151,75)-(219,85),0,bf
       CALL SetDrMd&(Rp&,1)
       Okay = FALSE : FOR Delay = 1 TO 1000 : NEXT Delay
       PUT(40,40),ScrSav&,PSET
       ERASE ScrSav& : COLOR 1,0 : RETURN
     END IF
     IF X > 53 AND X < 216 AND Y > 50 AND Y < 62 THEN
       LINE(Curs,52)-(Curs+7,60),0,bf
       FOR Delay = 1 TO 50 : NEXT Delay
       LINE(Curs,52)-(Curs+7,60),2,bf
       WHILE INKEY$ <> "" : WEND
       GOTO Loop
     END IF
   END IF
   GOTO AccessLoop
Loop:

   C$ = INKEY$ : I = MOUSE(0) : X = MOUSE(1) : Y = MOUSE(2)
   IF I <> 0 THEN
     WHILE I <> 0 : I = MOUSE(0) : X = MOUSE(1)
             : Y = MOUSE(2) : WEND
     Y=Y-1
     IF X > 150 AND X < 220 AND Y > 74 AND Y < 86 THEN
```

AMIGA UPDATE/AMIGABASIC TUTORIAL

```
    CALL SetDrMd&(Rp&,2) : LINE(151,75)-(219,85),0,bf
    CALL SetDrMd&(Rp&,1)
    Okay = FALSE : FOR Delay = 1 TO 1000 : NEXT Delay
    PUT(40,40),ScrSav&,PSET
    ERASE ScrSav& : COLOR 1,0 : RETURN
  END IF
  IF X > 50 AND X < 72 AND Y > 74 AND Y < 86
           AND LEN(FileName$) > 0 THEN
    ' Check for OK and length of file
    CALL SetDrMd&(Rp&,2) : LINE(51,75)-(71.85),0,bf
    CALL SetDrMd&(Rp&,1)
    FOR Delay = 1 TO 1000 : NEXT Delay : Okay = TRUE :
    fExist = TRUE
    PUT(40,40),ScrSav&,PSET
    ERASE ScrSav& : COLOR 1,0 : RETURN
  END IF
 END IF
 IF C$ = "" THEN GOTO Loop
 IF LEN(FileName$) = 0 THEN IF C$ < "A"
          AND ASC(C$) <> 13 GOTO Loop
 IF ASC(C$) = 13 THEN
  Okay = TRUE : fExist = TRUE
  PUT(40,40),ScrSav&,PSET
  ERASE ScrSav& : COLOR 1,0 : RETURN
 END IF
 IF ASC(C$) = 8 THEN
  FileName$ = LEFT$(FileName$,LEN(FileName$)-1)
  LINE(Curs,52)-(Curs+7,60),1,bf
  Curs = Curs-8 : LINE(Curs,52)-(Curs+7,60),2,bf
  GOTO Loop
 END IF
 IF LEN(FileName$) = 19 THEN GOTO Loop
 IF ASC(C$) = 8 THEN Loop
 IF C$ < " " OR (C$ > "Z" AND C$ < "a")
           OR C$ > "z" GOTO Loop
 FileName$ = FileName$ + C$
 LINE(Curs.52)-(Curs+7,60),1,bf
 COLOR 0,1 : CALL Move&(Rp&,0,59) : PRINT PTAB(Curs);C$;
 Curs = Curs + 8 : LINE(Curs.52)-(Curs+7,60),2,bf
 GOTO Loop

YNRequestor:
 Size& = FNArraySize&\2

 DIM ScrSav&(Size&)
 GET(40,40)-(230,90),ScrSav&
 LINE(40,40)-(230,90),2,bf
 LINE(40,40)-(230,90),0,b
 LINE(44,42)-(226,88),0,b
 LINE(50,74)-(72,86),3,bf
 LINE(50,74)-(72,86),0,b
 LINE(150,74)-(220,86),3,bf
 LINE(150,74)-(220,86),0,b
 CALL Move&(Rp&,53,83)
 COLOR 0,3 : PRINT "OK"
 CALL Move&(Rp&,160,83)
 COLOR 0,3 : PRINT "CANCEL"
 CALL Move&(Rp&,54,52)
 COLOR 0,2 : PRINT Prompt$
 CALL Move&(Rp&,54,62)
 COLOR 3,2 : PRINT Prompt2$

GetButton2:

 I = MOUSE(0) : X = MOUSE(1) : Y = MOUSE(2)
 IF I <> 0 THEN
   WHILE I<>0 : I = MOUSE(0) : X = MOUSE(1)
             : Y = MOUSE(2) : Y = Y-1
   WEND
Cancel:
   IF X > 150 AND X < 220 AND Y > 74 AND Y < 86 THEN
     CALL SetDrMd&(Rp&,2)
     LINE(151,75)-(219.85),0,bf
     CALL SetDrMd&(Rp&,1)
     FOR Delay = 1 TO 1000 : NEXT Delay
     PUT(40.40),ScrSav&,PSET
     ERASE ScrSav&
     Okay = FALSE
     COLOR 1,0
     RETURN
   END IF
Ok:
   IF X > 50 AND X < 72 AND Y > 74 AND Y < 86 THEN
     CALL SetDrMd&(Rp&,2)
     LINE(51,75)-(71,85),0.bf
     CALL SetDrMd&(Rp&,1)
     FOR Delay = 1 TO 1000 : NEXT Delay
     PUT(40.40).ScrSav&,PSET
     Okay = TRUE
     ERASE ScrSav&
     COLOR 1,0
     RETURN
   END IF
 END IF
 GOTO GetButton2
```

END

TELECOMMUNICATIONS/CONNECT!

Continued from pg. 60

mation down, but there is usually another option. Most systems acknowledge the CONTROL-S and CONTROL-Q as a stop and restart signal. Press the CONTROL key and while holding it, press the S key. This will cause the text to be paused on most systems. Press the CONTROL key and while holding it, press the Q key. This will cause the other system to start sending again. Another option is to use a terminal program that has a capture buffer. This buffer will capture all text as it is displayed on your screen. Most terminal programs then offer you the option of saving this buffer to disk, dumping it to a printer, or viewing it on the screen. If you are calling long distance or connected to a pay service, you might consider logging off before you read or print the buffer. This will save you some money.

Q: I bought the 1660 modem and I have a 1902A monitor. How do I hook up my audio cable?

A: The audio connector used for a 1660 is on the rear of your 1902A monitor. It is marked AUDIO IN and has a small musical note above it. You can use the cable that was included with your 1660 or any suitable replacement cable.

Q: I have been given an RS-232 type of modem. Can this be used with my 128?

A: You can use an RS-232-type modem with either a 128 or 64 if you have an RS-232 interface. Commodore no longer makes an RS-232 interface, but several third party companies do make RS-232 interfaces for the 64 and 128. With the use of an RS-232-type of modem and interface, you may also need an additional cable or two. Software may be a bit harder to locate compared to the direct connect type of modem, but it is available. Your local user's group is the best place to start. Here are three companies that you might want to contact for RS-232 interfaces.

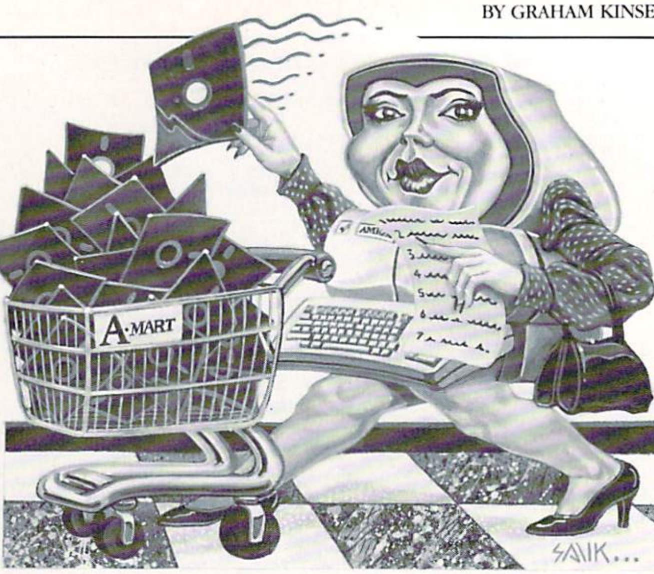
Omnitronix 206-236-2983
Micro R&D 303-985-1473
CT Micro Computers 203-354-9395

C

BY GRAHAM KINSEY

Amiga Public Domain Software

Amiga users have had many public domain programs available to them for months now. A year ago the reason for this might have been the lack of commercial software available. But even with over 350 commercial titles available, Amiga public domain libraries still continue to grow.



ED SAUK

Where to Get Them

For most people, the Amiga is not their first computer and the concept of public domain is not new. But just because you know where to get 64 public domain software doesn't mean you'll grasp the Amiga public domain scene quickly—it's a whole new ballgame! So for those who don't want to spend a lot of money getting public domain software, but at the same time, don't want to get a program nine months later and three revisions too late, there are three sources you should consider.

The first two are disk series: collections of public domain programs copied onto disk and then distributed to users throughout the country. The first, and larger of the two, is the Fish series, compiled and documented by Fred Fish. As I write this, the Fish series is up to disk 46, and at 880K per disk, that's 40 megabytes in public domain programs! The other disk series is the AMICUS series, compiled and documented by John Foust, head of the AMICUS network. AMICUS stands for Amiga Computer Users, an association of Amiga users, developers and user groups from all over the United States, Canada and Europe. At the moment, the AMICUS series is up to disk 14.

You should take a serious look at the AMICUS disks, despite the smaller size and programs already on the Fish disks, for several reasons. First of all, if you are at all interested in AmigaBASIC programs, be forewarned that Fred Fish claims to "speak no BASIC," whereas on each AMICUS disk there are usually several AmigaBASIC programs. Also, if you prefer to use your Amiga from Workbench, the AMICUS series fully supports Workbench with loads of icons on each disk. The Fish disks are designed for access via CLI; with some that can only run from CLI. This saves some space, but prohibits any access of programs on the Fish disks from Workbench. In general, the Fish disks are designed for the intermediate to advanced user, whereas the AMICUS disks are more suitable for a beginning Amiga user.

The documentation on the Fish disks is adequate. There is a wealth of C source code (C being the defacto programming language on the Amiga) on each disk, as well as assembly routines and other codes. If the program was uploaded to Usenet (a network where most of the advanced utilities, programmers' aids and Unix ports come from), there is also the original posting about the program that the programmer provided when he or she uploaded the program. The documentation on the AMICUS disks is adequate enough for even the first-time user, and there will sometimes be source code accompanying the programs.

Although you may know of a local user's group or some other organization that has its own public domain disk series, chances are that they get many of the programs from the Fish and AMICUS series. The Fish and AMICUS series are reasonably priced ($5 and $7, respectively) compared to some other disks. In fact, I have seen public domain disks that cost as much as $13 per disk!

The last source for public domain programs that you should check out is a commercial telecommunication service (network). Downloading Amiga public domain programs off of these services is not the cheapest way to get them, but is certainly the fastest (after all, time is money). Many people are familiar with the better known services such as The Source, CompuServe, QuantumLink (which still does not support the Amiga), and Delphi.

If you're interested in Amiga information and programs for a low fee, the one I recommend is American PeopleLink (better known as PeopleLink or just PLink). Despite a recent price increase, PeopleLink still has the lowest evening flat-fee rate at 1200 baud—just $4.95 an hour. PeopleLink doesn't have some of the features that the other services do, like on-line newspapers, shopping catalogs and airline reservations, but if you're interested in just Amiga content anyway, why pay for all that other stuff?

What PeopleLink does have is the Amiga Zone, a 15-section area just for Amiga owners, with 15 different message bases, each with a file section and pertaining to a different topic of interest. And one of the System Operators (SYSOP) for the Amiga Zone is none other than John Foust, head of the AMICUS network. As a result, any program that is on the AMICUS series is available on PeopleLink before you can get a hold of the program on an AMICUS disk.

Also, uploading a program to PeopleLink is free of charge. When you download a file from PeopleLink, you can take advantage of a special protocol available exclusively on PeopleLink, Windowed Xmodem (WXmodem), that can speed up transmissions from 30% to as much as 100%.

Recommended Programs

Now we get to actual programs. Terminal programs are always very important, whether you're hooking up to a network,

a local BBS, or a mainframe at work. Here are two public domain terminal programs that should satisfy the needs of most Amiga users.

The first is the Communicator, version 1.32, by Donald J. James (better known as D.J. James). This program has most of the features Amiga owners have come to expect from public domain terminal programs and has some features that the commercial programs still lack. Communicator doesn't hog the power of the Amiga when it runs, so you can multitask easily. It also has an uncluttered but full-featured menu structure, so first-time users won't be bewildered.

Communicator has fast screen input/output, and can easily keep up with 2400 baud. Macros and phone directories are available, and each is saved as a text file so they can be edited by any word processor/text editor. And if you have left Ed in your C directory, it will be auto-loaded so that you can edit a macro or phone directory while the program is running. So, even if you don't have a CLI available, you don't have to exit Communicator!

Although many terminal programs now support automatic chopping of Xmodem padding while transferring a file, Communicator is unique in that it is intelligent with its chopping. If you tell Communicator that you are transferring an archived file (by giving the name of the file and .arc extension), Communicator will automatically disable chopping for that file. This is very important, not because archived files don't need to be chopped, but because chopping an archived file can actually destroy part of the archive.

The buffers set aside for text and file transfer are much bigger in Communicator than in most programs. There is an 8K buffer for ASCII transfers and a fat 16K for Xmodem transfers. With buffers that large, downloading to RAM in order to speed up the transmission is now no longer necessary. And finally, Communicator is one of only two public domain terminal programs to support Windowed Xmodem for use with PeopleLink (the other is a program called MOTE, which has a slightly faster implementation of WXmodem than Communicator, but otherwise is not as full-featured as Communicator).

The other terminal program is a must-have for Amiga users who wish to access a mainframe. This terminal program is called Tek4010, written by Steve Poling and Terry Whelan. This program has two different types of emulation. The first is the all-popular VT100 emulation with both Xmodem and Kermit protocols supplied for file transfer. Also included in the VT100 part of the program is execution via a script file, which allows you to automate the log-on procedure, as well as any other part of telecommunications, including file transfer. Script files are a feature usually found only in commercial programs, so having scripts available in a public domain terminal program is a real blessing.

The other emulation mode is a brand new one for the Amiga, Tektronix 4010 emulation. This emulation is only possible because of the Amiga's unique graphics capabilities; no other off-the-shelf micro under $10,000 has graphics capability good enough for Tektronix emulation (an IBM-PC could do it, but only after a graphics card was added that had at least EGA capability). When the program receives graphics commands from the host, it produces the graphics on the terminal screen, writing over any text that is there. Two resolutions are supported, 640 by 400 and 1024 by 780. When in the higher mode, only a part of the display is shown, but you can scroll to any portion of the display.

Both terminal programs are available on PeopleLink, and Communicator is also available on Delphi. Both D.J. James and Steve Poling are available on PeopleLink (D.J.'s PLink ID is DJJAMES, Steve's PLink ID is SPOLING). As I write this, neither program is currently available on either the Fish or the AMICUS series. So if you are interested in the programs and are not a subscriber to PeopleLink or Delphi, you'll have to wait.

Next month I will delve into Amiga utilities, which are a strongpoint of public domain programs. I welcome any comments or suggestions. I can be reached on PeopleLink (my ID is GKINSEY), the Wonderland BBS (617-665-3796), and IDCMP (617-769-8444 8 PM-8AM). C

Fish disks

$5 per disk, or for a catalog, send a SASE and three loose stamps to Fred Fish, 1346 West Tenth Place, Tempe, AZ 85281

AMICUS disks

$7 per disk, or send $1 for a catalog to PiM Publications, P.O. Box 869, Fall River, MA 02722

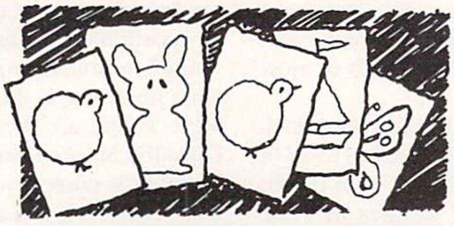
PeopleLink

American PeopleLink, 3215 N. Frontage Road Suite 1505, Arlington Heights, IL 60004-1437, 1-800-524-0100 (voice), 1-800-826-8855 (modem) C

BY CHARLES D. ARCENEAUX

Concentration

A Memory Game for the Commodore 128



BOB CLARK

This is a good family game because the skills it uses—memory and observation—do not necessarily improve with age.

The game of Concentration, also known as Memory and Pelmanisms, predates the famous television game show of the same name. You can play this game with almost any deck of cards, as long as there are matching pictures or values present in the deck, or you can buy a deck specially designed for this game.

We have a deck like that at our house, but our very competitive children always get into arguments over the game. Accusations such as "You took two turns!" and "You didn't show me!" are common—and drive us adults crazy. A computer version of the game somewhat calms frazzled nerves, because the computer can unerringly referee without being accused of bias.

You will need two joysticks. I also recommend that you use a color monitor or television set, because of the way color codes are used to keep track of the score and players' turns.

Type in Concentration. Be sure to use the Magazine Entry Program and follow the directions carefully. After the program is properly typed in and saved to disk or tape, run it. The screen will be blank for a few minutes while the game is set up. This is because the computer goes into the FAST mode for most of the set-up procedure. A bell will now ring 70 times—once for each card it places on the screen. This is a handy feature for people who like to go get a snack while the program is warming up.

Plug your two joysticks in before it gets to this point. The red player's joystick is plugged into joystick port 1 and the blue player's joystick is plugged into port 2. As each person's turn comes up, a cursor of that color will appear on the screen and a horn will sound.

Each player gets to turn over two cards. (The cards are numbered consecutively as a memory aid.) If both cards have the same picture, the player gets to keep the cards and takes another turn. The computer indicates "keeping" by turning the pictures your color, either red or blue. It does this while playing an arpeggio and adding one to a score display at the bottom of the screen.

Cards are turned over by moving the cursor about the screen with the joystick. The cursor will move up or down, left or right, according to the way you push the joystick. It will also go from the right edge to the left edge, for example, from card 10 on the right edge to card 11 on the left edge, by pushing the joystick right (and vice-versa).

When the joystick has been positioned over the desired card, simply press the fire button and the card will be turned over. If there is no match with the second card, the program will allow a slight time delay before turning the backs up and giving the other player a turn.

This is a good family game because the skills it uses—memory and observation—do not necessarily improve with age. Also, it is very easy to organize a tournament with this game by letting each contestant in turn play the winner of the last match.

There is a winning strategy. When trying for a match, always turn the card you are least sure of up first. This will limit the usefulness of a mistake to the other player.

There are two changes you might want to make to this program. First, if you have a 1571 disk drive, you will want to change line 20 to 20 DCLEAR:DSAVE "CONCENTRATION":GOTO 50. Or if you only have a tape drive, change line 20 to 20 SAVE"CONCENTRATION": GOTO 50. Of course, if you have a 1541 or a 1541-compatible such as mine, leave it this way: 20 DCLEAR:SAVE "@CONCENTRATION",8:GOTO 50.

Line 20 is an automatic save routine. In other words, if the program is already in memory, you can save it to tape or disk by typing RUN 20 and pressing the RETURN key. The program will save itself on whatever tape or disk is present in the drive before going on to run. This makes saving a corrected version of the program easier for me during development, and is also useful after the program is finished to make additional copies of the program on other tapes or disks.

The other change you might want to make is to get rid of all the REM statements. REM statements are strictly for the programmer to remember what he was doing in that part of the program. If you consider yourself a user and not a programmer, you will have no use for REM statements and the program will load and run slightly faster without them.

If you consider yourself a programmer, leave them in. The game has 35 approximately sprite-sized pictures made with the BOX, DRAW, CIRCLE and PAINT commands available on the 128. Eleven of these are plain ordinary things such as circles and triangles, but the other 24 are things such as a butterfly and a knife, an automobile and keys, and lots of other objects. With the REMs left in, this part of the program could be used as a sort of cookbook on how to draw 24 approximately sprite-sized pictures.

On the other hand, you may not like my pictures and may want to substitute your own. In this case, you can use the REM statements as a guide to what code to replace in order to substitute another picture. In general, each picture definition starts with the appropriate REM statement and ends with a GOSUB statement (the subroutine stores the picture in an array and clears the screen to make ready for the next picture definition).

Drawing on the 128 can be quite different from drawing on the 64. Traditional 64 pictures are done by drawing the picture onto a grid, translating the picture into the bit patterns necessary to form them on the screen, then poking the bit patterns.

When I make a picture on the 128, I first draw it on a plain piece of paper. I then break the picture down into circles, curves, straight lines and painted areas. I guess at the X, Y coordinates necessary to translate these into BOX, DRAW, CIRCLE, and PAINT commands. (Originally I drew the picture on a grid, but I discovered that my guess was as good as an X, Y coordinate read off of a grid.)

After typing the commands in to draw the picture, I then try it out. Usually the picture is slightly off and needs tuning. This I do by changing the X, Y and other values in the BOX, DRAW, CIRCLE, and PAINT commands. Sometimes I am quite far off, such as a PAINT command that is not inside an enclosed area, but I usually can get the picture looking pretty decent after two or three attempts.

If I am successful (meaning sometimes I am not), I have an extra bonus. A picture implemented with these four commands is usually more compact (uses less bytes of program space) than one done with pokes. Besides, I enjoy the challenge.

Speaking of challenge—go ahead and type in this program and challenge a friend or enemy to a game. Even if you lose, you will have the satisfaction of playing a 500-year-old game on your computer. ■

Before typing these programs, read "How to Enter Programs," and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Concentration

```
10 GOTO 50'BCMW
20 DCLEAR:SAVE"@:CONCENTRATION",8
   :GOTO 50'DHEF
30 SSHAPE P$(I),0,0,31,23:I=I+1
   :SCNCLR 1'EVSG
40 RETURN'BAQA
50 FAST'BBJC
60 GRAPHIC 1,1'BDHD
70 SSHAPE C$,0,0,18,12:GSHAPE C$,0,0,
   1'CVQI
80 SSHAPE C$,0,0,23,21'BMJH
90 SPRSAV C$,1:SPRSAV C$,2'CLJI
100 CO(1)=03:CO(2)=07'CPTY
110 N$(1)="RED":N$(2)="BLUE"'CLTB
120 SPRITE 1,0,11,1,1,1
   :SPRITE 2,0,15,1,1,1'CCWD
130 COLOR 0,14:COLOR 1,10
   :SCNCLR 1'DLRC
140 DIM C$(70),P$(35),P(70),X(70),
   Y(70),A(70)'BMHG
150 FOR I=1 TO 70'DEIC
160 IF I<10 THEN CHAR 1,1,1,STR$(I)
   :ELSE CHAR 1,0,1,STR$(I)'IWUL
170 BOX 1,0,0,31,23:BOX 1,1,1,30,
   22'CXQI
180 BOX 1,4,4,27,19:BOX 1,6,6,25,
   17'CXBJ
190 SSHAPE C$(I),0,0,31,23'BPOH
200 NEXT'BAEV
210 REM DEFINE 40 SHAPES'BOWB
220 I=1:SCNCLR 1'CEBA
230 REM X (1)'BEEA
240 BOX 1,14,0,17,20,45,1'BRTE
250 BOX 1,14,0,17,20,315,1'BSQF
260 GOSUB 30'BCOC
270 REM CROSS (2)'BIFF
280 BOX 1,14,1,17,20,90,1'BRUI
290 BOX 1,14,1,17,20,0,1'BQSI
300 GOSUB 30'BCOW
310 REM HAPPY FACE (3)'BMNB
320 CIRCLE 1,15,12,10,10
   :PAINT 1,15,12'CVJE
330 CIRCLE 0,15,16,7,3,100,260'BTVE
340 CIRCLE 0,15,14,2,2'BLPD
350 CIRCLE 0,12,7,2,2:CIRCLE 0,20,7,2,
   2'CVJH
360 GOSUB 30'BCOD
370 REM SAD FACE (4)'BKAG
380 CIRCLE 1,15,12,10,10
   :PAINT 1,15,12'CVJK
390 CIRCLE 0,15,19,7,3,290,70'BSKK
400 CIRCLE 0,15,12,2,2'BLNA
410 CIRCLE 0,10,7,2,2:CIRCLE 0,20,7,2,
   2'CVHE
420 GOSUB 30'BCOA
430 REM CHURCH (5)'BJJD
440 DRAW 1,5,1 TO 5,20 TO 25,20 TO 25,
   15 TO 22,10 TO 7,10 TO 5,1'HGNM
450 DRAW 1,25,15 TO 10,15 TO 7,10'DQHI
460 PAINT 1,6,19'BGIG
470 DRAW 0,10,19 TO 10,16
   :GOSUB 30'DPYJ
480 REM HEART (6)'BIMI
490 CIRCLE 1,13,7,5,5:PAINT 1,12,
   7'CREM
500 CIRCLE 1,22,7,5,5:PAINT 1,21,
   7'CREE
510 DRAW 1,9,9 TO 17,20 TO 26,9'DOJE
520 PAINT 1,17,15:GOSUB 30'CKUE
530 REM SPADE (7)'BIGE
540 CIRCLE 1,12,15,4,4:PAINT 1,12,
   15'CTTI
550 CIRCLE 1,22,15,4,4:PAINT 1,22,
   15'CTVJ
560 DRAW 1,8,14 TO 17,1 TO 27,14'DPSK
570 BOX 1,16,15,18,23,,1'BQEJ
580 PAINT 1,17,3:GOSUB 30'CJTK
590 REM APPLE (8)'BIMK
600 CIRCLE 1,12,15,6,6:PAINT 1,13,
   16'CTAF
610 CIRCLE 1,22,15,6,6:PAINT 1,22,
   16'CTBG
620 CIRCLE 1,17,12,11,11,90,270'BUVG
630 DRAW 1,16,9 TO 16,4 TO 18,2'DOCH
640 PAINT 1,15,21:GOSUB 30'CKPH
650 REM BOWL (9)'BHBH
660 CIRCLE 1,15,12,10,11,90,270'BUSK
670 CIRCLE 1,15,12,10,4'BMHK
680 CIRCLE 1,15,12,9,3'BLWK
690 PAINT 1,15,17:GOSUB 30'CKUM
700 REM CUP (10)'BHPD
710 CIRCLE 1,14,10,7,8,90,270'BSGG
720 CIRCLE 1,14,10,7,4:CIRCLE 1,14,10,
   6,3'CXGJ
730 CIRCLE 1,21,12,4,3,0,220'BRMI
740 PAINT 1,14,15:GOSUB 30'CKRI
750 REM BALL (11)'BIRI
760 CIRCLE 1,15,12,9,9:PAINT 1,15,
   12'CTEM
770 GOSUB 30'BCOI
780 REM CIRCLE (12)'BKTL
790 CIRCLE 1,15,12,9,9'BLDM
800 CIRCLE 1,15,12,8,8:CIRCLE 1,15,12,
```

```
    7,7'CXWI
810 GOSUB 30'BCOD
820 REM SQUARE (13)'BKVH
830 BOX 1,9,5,23,18,,1:GOSUB 30'CRBJ
840 REM OPEN SQUARE (14)'BOVK
850 BOX 1,9,5,23,18:BOX 1,8,4,24,
    19'CXDN
860 BOX 1,7,3,25,20:GOSUB 30'COFM
870 REM TRIANGLE (15)'BMFM
880 DRAW 1,15,2 TO 25,18 TO 6,
    18 TO 15,2'ETYQ
890 PAINT 1,15,12:GOSUB 30'CKPO
900 REM OPEN TRIANGLE (16)'BQGH
910 DRAW 1,15,2 TO 25,18 TO 6,
    18 TO 15,2'ETYK
920 DRAW 1,15,4 TO 23,17 TO 8,
    17 TO 15,4'ETBL
930 GOSUB 30'BCOG
940 REM DIAMOND (17)'BLRK
950 BOX 1,10,5,20,15,45,1
    :GOSUB 30'CUJN
960 REM OPEN DIAMOND (18)'BPSN
970 BOX 1,10,5,20,15,45'BPFN
980 BOX 1,8,3,22,17,45:GOSUB 30'CRIP
990 REM CLUB (19)'BILO
1000 CIRCLE 1,15,7,4,4:PAINT 1,15,
     7'CRHX
1010 CIRCLE 1,8,12,4,4:PAINT 1,8,
     12'CRDY
1020 CIRCLE 1,22,12,4,4
     :PAINT 1,22,12'CTPA
1030 DRAW 1,15,7 TO 12,19 TO 18,
     19 TO 15,7:PAINT 1,15,17'FDOF
1040 GOSUB 30'BCOW
1050 REM SHOVEL (20)'BKTB
1060 DRAW 1,5,5 TO 10,0
     :DRAW 1,5,6 TO 10,1'ETXF
1070 DRAW 1,7,3 TO 20,16'CKMD
1080 CIRCLE 1,18,14,5,7,90,270,
     315'BWCG
1090 DRAW 1,14,17 TO 21,11'CMHF
1100 PAINT 1,21,17:GOSUB 30'CKRW
1110 REM RAKE (21)'BIBW
1120 DRAW 1,4,1 TO 19,16'CKPY
1130 DRAW 1,5,2 TO 20,17'CKKA
1140 DRAW 1,16,19 TO 24,14'CMRB
1150 J=19:FOR K=16 TO 25 STEP 3'FKHE
1160 DRAW 1,K,J TO K,J+5:J=J-2'FNNG
1170 NEXT:GOSUB 30'CDVC
1180 REM BAR (22)'BHZE
1190 BOX 1,4,6,36,17,,1
     :CHAR 0,1,1,"BAR"'CVQJ
1200 SSHAPE P$(I),4,0,35,23:I=I+1
     :SCNCLR 1'EVBC
1210 REM INFINITY SIGN (23)'BQXA
1220 CIRCLE 1,12,12,6,6
     :CIRCLE 1,12,12,5,5'CXID
1230 CIRCLE 1,24,12,6,6
     :CIRCLE 1,24,12,5,5'CXOE
1240 GOSUB 30'BCOY
1250 REM ARROW (24)'BJIC
1260 DRAW 1,16,1 TO 24,1 TO 24,
     9 TO 16,1'ESRH
1270 PAINT 1,23,4'BGBE
1280 BOX 1,12,0,14,22,45,1
     :GOSUB 30'CUHI
1290 REM PITCHER (25)'BLKH
1300 CIRCLE 1,18,14,9,9
     :PAINT 1,15,11'CTIB
1310 DRAW 1,9,15 TO 4,12 TO 4,1 TO 27,
     1 TO 20,15:DRAW 1,12,15 TO 12,
     1'HJCI
1320 PAINT 1,24,3:GOSUB 30'CJRB
1330 REM FLOWER (26)'BKXC
1340 BOX 1,15,7,16,23'BMRD
1350 CIRCLE 1,5,23,10,9,10,90'BRZF
1360 CIRCLE 1,27,23,10,11,270,350'BVUG
1370 FOR K=1 TO 360 STEP 27'EHDG
1380 DRAW 1,15,7 TO 7;K:NEXT'DKOI
1390 GOSUB 30'BCOF
1400 REM FLOWER 2 (27)'BLXA
1410 BOX 1,15,10,16,23'BNJB
1420 CIRCLE 1,3,23,12,12,10,90'BSQD
1430 CIRCLE 1,29,23,12,13,270,350'BVBE
1440 CIRCLE 1,15,0,11,11'BMDE
1450 DRAW 1,5,1 TO 11,5 TO 15,1 TO 20,
     5 TO 26,1'FVNJ
1460 PAINT 1,15,9:GOSUB 30'CJXG
1470 REM ROBOT (28)'BJHG
1480 BOX 1,14,1,16,3,,1:REM HEAD'CTKK
1490 BOX 1,12,5,18,11,,1:REM BODY'CUOL
1500 BOX 1,12,13,18,15,,1
     :REM PELVIS'CXYE
1510 BOX 1,13,15,14,24:BOX 1,16,15,17,
     24'CCMF
1520 DRAW 1,8,12 TO 8,6 TO 22,6 TO 22,
     12'ESVG
1530 GOSUB 30'BCOB
1540 REM BUTTERFLY (29)'BNMG
1550 CIRCLE 1,15,12,1,8
     :PAINT 1,15,12'CTUI
1560 CIRCLE 1,15,2,4,4,120,240'BSRI
1570 CIRCLE 1,6,6,8,3,,,45
     :PAINT 1,6,6'CUXK
1580 CIRCLE 1,6,18,7,4,,,315
     :PAINT 1,6,18'CXRM
1590 CIRCLE 1,24,6,8,3,,,315
     :PAINT 1,24,6'CXLN
1600 CIRCLE 1,24,18,7,4,,,45
     :PAINT 1,24,18'CYPF
1610 CIRCLE 0,5,5,2:CIRCLE 0,5,19,
     3'CQLE
1620 CIRCLE 0,25,5,2:CIRCLE 0,25,19,
     3'CSFG
1630 GOSUB 30'BCOC
1640 REM CAR (30)'BHZF
1650 CIRCLE 1,16,13,14,9,270,20'BTBI
1660 CIRCLE 1,22,12,6,5,0,90'BQEI
1670 DRAW 1,21,4 TO 21,8'CKLJ
1680 DRAW 1,2,12 TO 28,12'CLJK
1690 PAINT 1,15,10'BHVK
1700 BOX 0,13,5,20,7'BLRC
1710 CIRCLE 1,8,12,3,3,90,270
     :PAINT 1,8,13'CYQH
1720 CIRCLE 1,21,12,3,3,90,270
```

```
     :PAINT 1,21,13'CBCI
1730 GOSUB 30'BCOD
1740 REM BIRD (31)'BIAG
1750 CIRCLE 1,10,5,5,5:PAINT 1,10,
     5'CRAJ
1760 CIRCLE 0,8,2,2,2'BJSI
1770 CIRCLE 1,16,11,8,8,90,270'BSKL
1780 DRAW 1,10,11 TO 30,11 TO 18,
     14'DRYN
1790 DRAW 1,10,5 TO 1,5 TO 10,7'DNLN
1800 PAINT 1,16,12'BHYD
1810 GOSUB 30'BCOC
1820 REM SUN (32)'BHIF
1830 CIRCLE 1,15,12,7,7'BLYG
1840 FOR K=0 TO 360 STEP 24'EHYI
1850 LOCATE 15,12:DRAW 1,7;K TO 4;
     K'DONL
1860 NEXT:GOSUB 30'CDVI
1870 REM DAGGER (33)'BKOK
1880 BOX 1,14,1,16,9,,1'BODM
1890 DRAW 1,9,11 TO 11,9 TO 20,
     9 TO 22,7'ESXQ
1900 DRAW 1,13,10 TO 17,10 TO 15,
     23 TO 13,10'EWBI
1910 PAINT 1,14,11:GOSUB 30'CKNG
1920 REM KEY (34)'BHWG
1930 CIRCLE 1,8,12,7:PAINT 1,8,12'CPPJ
1940 CIRCLE 0,6,12,2:PAINT 0,6,12'CPEK
1950 DRAW 1,9,10 TO 28,10 TO 31,
     14'DQJM
1960 FOR K=1 TO 4'DDJK
1970 DRAW 1,1;270 TO 3;225 TO 3;
     315'DRGO
1980 NEXT:PAINT 1,27,11:GOSUB 30'DLZO
1990 REM KEY 2 (35)'BIXN
2000 CIRCLE 1,6,12,5,6:CIRCLE 1,6,12,
     4,5'CVWY
2010 DRAW 1,10,12 TO 31,12'CMAX
2020 DRAW 1,27,13 TO 27,20'CMNY
2030 CIRCLE 1,27,20,4,5,270,90'BSFB
2040 GOSUB 30'BCOX
2050 FOR I=1 TO 35'DEJB
2060 P(I)=I:P(I+35)=I'DNWF
2070 NEXT'BAEB
2080 FOR I=1 TO 70'DEIE
2090 K=INT(RND(0)*70+1)
     :IF K=I THEN 2090'IQTL
2100 T=P(K):P(K)=P(I):P(I)=T'DUVB
2110 NEXT:SLOW'CCXW
2120 I=1:PLAY"V1O6T9U8H"'CEWB
2130 FOR Y=0 TO 151 STEP 24'EHGC
2140 FOR X=0 TO 319 STEP 32'EHKD
2150 PLAY"B"'BBSB
2160 GSHAPE C$(I),X,Y,1'BLXE
2170 X(I)=X:Y(I)=Y'CLBG
2180 I=I+1'CDFF
2190 NEXT:NEXT'CBLF
2200 PL=2:G(1)=1:G(2)=1'DPBB
2210 SPRITE PL,0'BFCX
2220 IF PL=2 THEN PL=1:ELSE PL=2'GKQE
2230 SPRITE PL,1'BFDA
2240 PLAY"V1T5U8O4QCMU0"'BBXE
2250 FOR K=1 TO 2'DDHD
2260 J=JOY(PL)'CFIE
2270 IF J<100 THEN 2340'DILG
2280 IF A(G(PL))<>0 THEN 2340'ENJJ
2290 I=G(PL)'BGVH
2300 K(K)=I'BFAX
2310 IF K(K)=K(K-1) THEN 2260'ENMD
2320 GSHAPE P$(P(I)),X(G(PL)),
     Y(G(PL))'BBOF
2330 GOTO 2400'BEDB
2340 IF J=1 THEN G(PL)=G(PL)-10
     :IF G(PL)<1 THEN G(PL)=G(PL)
     +10'KIUP
2350 IF J=3 THEN G(PL)=G(PL)+1
     :IF G(PL)>70 THEN G(PL)=70'JDPO
2360 IF J=5 THEN G(PL)=G(PL)+10
     :IF G(PL)>70 THEN
     G(PL)=G(PL)-10'KJBR
2370 IF J=7 THEN G(PL)=G(PL)-1
     :IF G(PL)<1 THEN G(PL)=1'JBUP
2380 MOVSPR PL,X(G(PL))+22,
     Y(G(PL))+50'DAHM
2390 GOTO 2260'BEHH
2400 NEXT K'BBEX
2410 IF P(K(1))<>P(K(2)) THEN
     2520'ESJF
2420 COLOR 1,CO(PL)'BITC
2430 GSHAPE P$(P(K(1))),X(K(1)),
     Y(K(1))'BCPH
2440 PLAY"V1O5T0U8QG.V2IRQAV3IRBMV1O6
     CMU0"'BBOL
2450 GSHAPE P$(P(K(2))),X(K(2)),
     Y(K(2))'BCSJ
2460 A(K(1))=PL:A(K(2))=PL'CTXJ
2470 S(PL)=S(PL)+1'CLNJ
2480 CHAR 1,10*PL,22,N$(PL)+STR$(S(PL)
     )'EXAO
2490 COLOR 1,10'BEOI
2500 IF S(1)+S(2)=35 THEN 2560'EOJE
2510 GOTO 2250'BEGB
2520 FOR Z=1 TO 400:NEXT Z'EHMF
2530 GSHAPE C$(K(1)),X(K(1)),Y(K(1)),
     1'BBKI
2540 GSHAPE C$(K(2)),X(K(2)),Y(K(2)),
     1'BBNJ
2550 GOTO 2210'BECF
2560 IF S(1)>S(2) THEN W=1
     :ELSE W=2'GNSM
2570 CHAR 1,16,23,N$(W)+" WON"'CNJL
2580 PLAY"V1O4T8U8QEIEAQBO5W#C"'BBNN
2590 CHAR 1,4,24,"PRESS FIRE BUTTON
     TO PLAY AGAIN"'BHBS
2600 FOR I=1 TO 2:SPRITE I,0:J=JOY(I)
     :IF J>100 THEN I=20'KVPL
2605 NEXT:IF I>4 THEN 2610
     :ELSE GOTO 2600'GMSL
2610 FOR I=22 TO 25:CHAR 1,4,I,"
     [SPACE32]":NEXT'FNRK
2620 S(1)=0:S(2)=0:K(0)=0:K(1)=0
     :K(2)=0'FEYL
2630 FOR I=1 TO 70:A(I)=0:NEXT'FLGI
2640 GOTO 2050'BEEF
```

END

BY ARI UMKOSKI

Blimps

for the Commodore 64

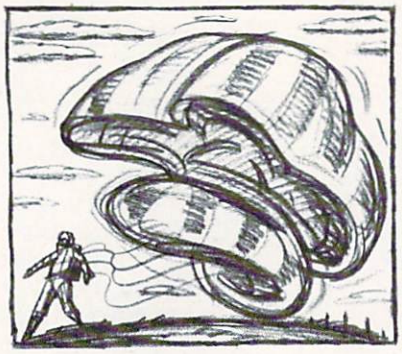
The Blimps game was inspired by the game Hail published in *Commodore Power/Play* in the March, 1985, issue—surely the best game ever written in only three lines of BASIC.

The secret of both games is to use the built-in scrolling mechanism of the Commodore 64 to provide the main source of action. (Who says BASIC games have to be slow?)

The object of Blimps is simple—guide a parachutist down to the ground. But this is not as easy as it sounds. Those constantly-rising barrage balloons keep getting in the way, and colliding with them is fatal! You can move your parachutist in any direction including up, but, in this case, the best you can do is keep in step with the rising balloons.

When you get close to the ground, the barrage balloons stop rising. This is to give you a chance to land, otherwise on the last line the barrage balloons could just appear under your feet.

Blimps also trails an attractive vapor trail behind the parachutist. At the end (good or bad) you can review your last movements.



JIM OWENS

The object of Blimps is simple—guide a parachutist down to the ground. But this is not as easy as it sounds.

All you have to do is plug a joystick into port 2, type in Blimps, and happy landings!

How Blimps Works

For those of you who are interested in how Blimps works, a quick perusal will show that it is broken down into some short subroutines.

Line 5: Calls some initialization routines.

Line 10: This is the main program loop—the controlling variable is F which has three possible values:

0 Keep Playing

1 Successful Landing

2 The Parachutist Has Crashed

Line 15: Performs some closing up routines and, if desired, starts another round.

Subroutine 100-160: This controls the creation of new barrage balloons, which are randomly placed on the last line on the screen. It also changes the parachutist character to a vapor trail character.

Subroutine 200-280: This controls the movement of the parachutist; the two variables PX and PY control his position. It reads the joystick and uses the result as an offset into two arrays (XP, YP) that indicate the change of direction. This certainly saves a lot of IF statements. This routine also checks to see that we haven't collided with any barrage balloons. Lines 211 and 212 bounce the parachutist back if he gets too far to the edge.

Subroutine 1000-1999: This prints out the title screen.

Subroutine 2000-2099: Initializes a new round. (If you think my color scheme is strange, please take into account that I do most of my work on a black-and-white television set.)

Subroutine 3000-3020: Initializes the XP and YP arrays.

Subroutine 4000-4030: Prints the end of game screen.

Subroutine 5000-5050: Makes the explosion noise. (Please feel free to use this in your own programs.)

Subroutine 6000-6050: Makes the success chime noise. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Blimps

```
5 GOSUB 3000:GOSUB 1000'CJPF
10 GOSUB 100:GOSUB 200:IF F=0 THEN
   10'FMHC
15 GOSUB 4000:IF A$="Y" THEN GOSUB
   2000:GOTO 10'GOKI
20 END'BACX
100 PP=1024+PX+40*PY:POKE PP,90'FSLC
110 IF PY>19 THEN RETURN'EEGY
120 Y=INT(35*RND(1))'EIWB
125 PRINT"[HOME,DOWN24]";'BBBE
130 IF Y=0 THEN 155'DFIB
135 FOR Z=1 TO Y'DDLF
140 PRINT"[RIGHT]";'BBPY
150 NEXT Z'BBTA
155 PRINT"[SHFT Q5]"'BADJ
160 RETURN'BAQB
200 PP=1024+PX+40*PY:PC=PEEK(PP)'GTAF
203 IF PC=81 THEN F=2:GOTO 250'FKYE
205 JV=15-(PEEK(56320) AND 15)'EPTG
210 X1=PX+XP(JV):Y1=PY+YP(JV)'EVLF
211 IF X1<1 THEN X1=3'EGNC
212 IF X1>37 THEN X1=35'EIUD
213 IF Y1<0 THEN Y1=0'EGLE
214 IF YP(JV)<=0 THEN 220'EKTF
215 POKE PP,90'BFDD
216 PP=55296+PX+40*PY:POKE PP,2'FSYK
220 PP=1024+X1+40*Y1:PC=PEEK(PP)'GTSG
230 IF PC=81 THEN F=2:GOTO 250'FKYE
240 IF Y1=24 THEN F=1'EGCD
250 POKE PP,88'BFKC
260 PP=55296+X1+40*Y1:POKE PP,2'FSMJ
270 PX=X1:PY=Y1'CJCH
280 RETURN'BAQE
1000 PRINT"[CLEAR,DOWN2,SPACE6]
     WELCOME TO BLIMPS"'BALY
1005 PRINT"[SPACE6]------------------
     ---------"'BAAE
1010 PRINT"[DOWN3,SPACE6]
     YOU ARE A LITTLE MAN"'BATA
1020 PRINT"[SPACE3]DESCENDING ON A
     PARACHUTE[SPACE3,SHFT X]"'BAVD
```

GAME PROGRAMS/BLIMPS

```
1025 PRINT"[SPACE3]LEAVING BEHIND YOU
     A VAPOUR TRAIL [SHFT Z]"'BAVK
1030 PRINT"[SPACE3]AS YOU TRY TO
     AVOID THE RISING"'BAKF
1040 PRINT"[SPACE3]BARRAGE BALLOONS
     [SHFT Q5]"'BAAG
1045 PRINT"[SPACE2](WARNING
     : IF YOU APPROACH THE EDGE"'BAVL
1046 PRINT"[SPACE2]YOU WILL GET
     BOUNCED BACK)"'BAOK
1050 PRINT"[DOWN2,SPACE6]
     REACH THE GROUND BE A HERO"'BAGG
1060 PRINT"[DOWN,SPACE6]
     GOOD LUCK"'BAIC
1070 PRINT"[DOWN,SPACE3]
     (USE JOYSTICK PORT 2)"'BAKG
1090 INPUT"[DOWN2]PRESS RETURN TO
     BEGIN";A$'BDUJ
1095 GOSUB 2000'BEDI
1999 RETURN'BAQU
2000 PRINT"[CLEAR,BLUE]"'BAAU
2005 POKE 53281,7'BHCA
2010 PY=0:PX=20'CIDX
2020 PP=1024+PX+40*PY'EMFB
2030 PC=55296+PX+40*PY'ENFD
2040 POKE PP,88:POKE PC,2'CKXB
2050 F=0'BCOA
2099 RETURN'BAQM
3000 FOR K=0 TO 10:READ XP(K),YP(K)
     :NEXT'FRDB
3010 RETURN'BAQV
3020 DATA 0,0,0,-1,0,1,0,0,-1,0,-1,-1,
     -1,1,0,0,1,0,1,-1,1,1'BYNG
4000 IF F=2 THEN GOSUB 5000
     :T$="[RVS,SPACE7]YOU LOST[SPACE7,
     RVOFF]":BS=BS+1'HPFI
4010 IF F=1 THEN GOSUB 6000
     :T$="[RVS,SPACE7]YOU WON[SPACE7,
     RVOFF]":YS=YS+1'HPWJ
4015 A$="N"'BCBD
4017 PRINT"[CLEAR,DOWN4]",T$'BDVG
4018 PRINT"[DOWN3]CURRENT SCORES
     :"'BAMK
4019 PRINT"--------------"'BADJ
4020 PRINT"YOU[SPACE8]BARRAGE
     BALLOONS"'BAWF
4021 PRINT YS,"[SPACE4]",BS'BGCB
4025 INPUT"[DOWN6]DO YOU WANT TO PLAY
     AGAIN";A$'BDPL
4030 RETURN'BAQY
5000 POKE 54277,26:POKE 54278,10'CRFB
5010 POKE 54272,136:POKE 54273,19'CSEC
5020 POKE 54296,15:POKE 54276,129'CSLD
5030 FOR JJ=1 TO 900:NEXT JJ'EJHE
5040 POKE 54276,0:POKE 54296,0'CPYF
5050 RETURN'BAQC
6000 POKE 54277,26:POKE 54278,10'CRFC
6010 POKE 54272,32:POKE 54273,78'CRGD
6020 POKE 54296,15:POKE 54276,17'CRJE
6030 FOR JJ=1 TO 900:NEXT JJ'EJHF
6040 POKE 54276,0:POKE 54296,0'CPYG
6050 RETURN'BAQD
```

END

BY DEAN S. ROSSA



BRUCE WEINSTOCK

Parimutuel Racing
for the Commodore 64

I have seen variations on this horse racing program run in several languages on several computer systems. The race requires very little code in Commodore BASIC, and is brief even with six lines of code for sound and code for odds.

This version offers a better-than-sporting chance at picking winners. It mimics a parimutuel betting system. The program places random bets on the nine horses running and permits the user to use the odds figured from the set of computer-generated bets to improve his chances of winning.

In a parimutuel system, the odds are determined by the total amounts bet on the different horses. The entire amount bet, less a percentage for management, is paid to those holding winning tickets. Low odds on a horse imply more money has been bet on that horse. If the bettors are informed, more money on a horse implies the horse is more likely to win than the other horses. That is, low odds mark the horses most likely to win.

This program weights the moves of the horses so that those with low odds will win if the random number function acts exactly as one would expect it to during that race. After the user bets, a relatively high chance of winning is generated for an unknown random horse. This lets an underdog win occasionally. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Parimutuel Racing

```
10 S1=1064:SW=40:V=10:F6=55296
   :PRINT"[CLEAR]"'FYTG
20 VV=54296:WW=54276:AA=54277:HF=54273
   :LF=54272:PH=54275:PL=54274
   :S=54278'IMCR
30 S$="[CMDR P]":F$="[CMDR Y]"
   :FOR T=1 TO SW-V+1:A$=A$+S$
   :B$=B$+F$:NEXT'MCWO
40 RESTORE:FOR T=1 TO 9
   :B(T)=INT(RND(1)*5)+2:TA=TA+B(T)
   :M(T)=0:READ N$(T):NEXT'ONSR
50 PRINT"[CLEAR]HORSE";TAB(15);"ODDS"
   :'CGTG
60 FOR T=1 TO 9:PRINT T;
   N$(T)TAB(15)INT(TA/B(T));TAB(20);
   "TO"1:NEXT'JEOO
70 INPUT"[DOWN]WHICH HORSE";H
   :IF H<1 OR H>9 THEN 70'GJYM
80 INPUT "PLACE BET (10 OR LESS)";B
   :IF B >10 THEN B=10'FJOO
90 PRINT"[CLEAR] [BLACK]"A$
   :FOR T=1 TO 9:PRINT" [CMDR H]
   "SPC(SW-V-1)"[CMDR M]" : NEXT
   :PRINT" "B$'KQER
100 WC=INT(RND(1)*9)+1:B(WC)=INT(RND
   (1)*3)+5 :FOR A=S1 TO S1+8*SW
   STEP SW'QICN
110 I=I+1:A(I)=A:POKE A,48+I
   :POKE A+F64-1024,48+I
   :POKE A-1024+F64,0:NEXT'NPJN
120 FOR T=1 TO 14:POKE VV,15
   :POKE AA,88:POKE PH,15:POKE PL,15
   :POKE S,89'IIVJ
130 READ HI,LO,FE:POKE HF,HI
   :POKE LF,LO:POKE WW,65
   :FOR Q=1 TO FE:NEXT
   :POKE WW,64'JNYM
140 NEXT T:B=ABS(B):PRINT"[DOWN2]
   YOU BET " B "ON HORSE" H;
   N$(H)'EPQJ
150 X=INT(RND(1)*9)+1 :C=B(X)/2:Z=1024
   :IF M(X)=0 THEN POKE A(X)+1,
   32'NKRQ
160 A(X)=A(X)+C:POKE A(X),48+X
   :POKE A(X)-Z+F6,48+X
   :POKE A(X)-Z+F6,0'LPMR
170 M(X)=M(X)+C:POKE A(X)-C,32
   :POKE A(X)-C-Z+F6,32
   :IF M(X)>=SW-(V-1)THEN 200'OTNV
180 FOR T=1 TO 3: POKE VV,15
   :POKE HF,40 :POKE LF, 200
   :POKE WW,129 :'HFVO
190 FOR TT=1 TO 10*KK: NEXT:POKE WW,0
   :POKE AA,0:NEXT : GOTO 150'JXXO
200 PRINT X;N$(X);" WINS":W=W-B
   :IF X=H THEN W=W+B:W=W+INT(TA/B(X)
   )*B'NFUN
210 PRINT "[DOWN7]WINNINGS: ",W
   :PRINT "HIT A KEY TO CONTINUE. Q
   TO QUIT"'CDUK
220 GET K$:IF K$=""THEN 220'EIXC
230 I=0:TA=0: IF K$<>"Q"THEN 40'GLIF
240 DATA SCAMP,JUNEBUG,BETA BITS,
   ROCKY,EIGHT BALL,PIP,CHUTNEY,
   CHEERIO,SAM'BMCR
250 DATA 16,195,150,22,96,150,28,49,
   150,33,135,150,33,135,50,33'BEGL
260 DATA 135,50,33,135,150,28,49,50,
   28,49,50,28,49,150,22,96,150,
   28'BIKN
270 DATA 49,150,22,96,150,16,195,
   150'BCPI
```

END

Continued from pg. 45

As your source is compiled, the various label names are displayed, giving you an indication as to where you are in the compile process. Also, the compiler will place flags into your source code in case of an error. In the event of such an error, you are given the option of continuing, aborting or exiting to the editor. If you go directly to the editor, you will find the flag or flags that were set are given as the first option in your editing session. These flags are set according to the type of error that was recognized. By simply hitting RETURN, you are taken to the location in your source file that the compile error occurred. This certainly makes debugging easier. In fact, by using the RUN command, you can go from source to executable in a single step. Needless to say, this will help speed up any further debugging that needs to be done.

As for run-time speed, any internal functions, such as number crunching or string manipulation, occur at a very high speed. The only areas that I noticed a considerable slow-down was in the screen I/O functions. If you utilize the standard WRITE and WRITELN functions, you notice that the screen display seems to lag whatever else is going on. If you have built a custom display and are utilizing the graphics text functions, however, the speed with which the text is drawn is greatly increased.

Concerning the Amiga environment, currently the authors of the system have only included Amiga graphics, window and sound support. Very helpful technical support has indicated that there are plans for the addition of IDCMP/Intuition support as well as other system support to make the p-system fully Amiga-compatible.

The authors have included example programs with complete source files to demonstrate the various ways of implementing the Amiga-specific calls under the Pascal compiler. Also, they give a complete list of routines that are available, most of which can be directly related to their C counterparts, making them easy to understand and use. A few of the terms may make it difficult to follow at first; for example, the reference to a screen as a display and to a window as a screen. This becomes second nature, however, and I found that the graphics implementation is very logical.

The system can be purchased in two different configurations—a basic system or a ProPAK system. The basic system consists of the p-system, compiler of your choice, Advanced System Editor, File system, and Native Code Generation library. The ProPAK includes all functions of the basic system, plus the debugger, cross reference utility and system customization utilities. The basic system is available for a suggested list price of $99.95 and the ProPAK is available for $199.95. If you wish to add an additional compiler to your basic or ProPAK system, it is only $79.95.

Besides the Pascal and Assembler systems, Pecan Software Systems has also made the BASIC, FORTRAN and Modula-2 compilers available for the Amiga. All of these utilize native code generation wherever possible, producing a very optimized final product. All of these packages are now currently available.

Pecan Software Systems has a very good update policy. Under the current product structure, you can update a basic system for $79.95 or the ProPAK for $129.95. The company offers a technical support line and the people that you speak with are courteous and knowledgeable.

One thing I should bring out about this system is the fact that an application that is written under any of the p-system languages can only be run if the p-system run time is present. There isn't any method for compiling your p-code programs down to a file that the Amiga can recognize without the run time. Pecan Software Systems has given permission for you to include the required run-time files on disk with your application as long as the product is distributed as public domain or on a contribution basis only. If you wish to produce commercial products with the p-system, you should contact Pecan Software Systems for information regarding commercial licensing of the run-time package.

In closing, I must say that the p-system is a fantastic development environment. The only hampering item is the lack of stand-alone application support. The p-system gives you everything you would expect from a Pascal package. If you are working with the *MCC Pascal* compiler from Metacomco, you will find that all of your applications can be ported into the p-system with little or no modification. If you are looking for more than just a programming language, I highly recommend the UCSD p-system, along with its various compilers. ■

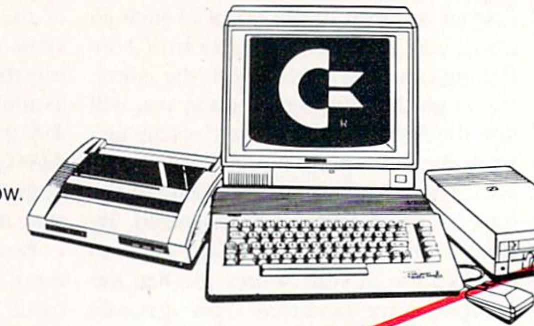
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Continued from pg. 16

gle of attack. By the same token, trying to quickly shift directions while being tackled by different defenders converging from different directions may result in the ball being stripped from your grasp. After watching my halfback break three tackles, then go for 65 yards of open field running, only to lose his handle on the ball at the ten-yard line. I've learned that sometimes it's smarter to simply quit while you are ahead rather than try for another foot of playing field.

There are a few things missing, like instant replay, competition between real pro teams, individual player stats, a bigger playbook, and cheerleaders on the sideline. A talk with Edward Fletcher, the game's creator, cast some light on these shortcomings. I must admit I feel a little uncomfortable suggesting that *Gridiron!* has any shortcomings at all since just a few years ago I would have been delighted with a football simulator with half the realism this one offers. But knowing the power and size the Amiga offers, I have become selfishly demanding.

Anyway, Fletcher quickly agreed the game would be better with some of those additions and what's more, he says they are planned for future versions (this review was done using version 1.1). But every plus has a minus, and the future releases of *Gridiron!* again prove this. Because the entire game is loaded into memory at once, there are no delays in play while data is transferred between memory and disk. But this also means the program's code must fit within your system's limit (V1.1 requires 512K and all but 10K of that is used by the program). Fletcher says to add all that users want will require more memory. As a result, options available to the user on future releases will have to be determined by the system's memory. Fletcher suggests that the final version of *Gridiron!* may even require 1MB of memory, but will be constructed so users with different memory limits will have access to those options which will fit.

This is the most enjoyable, realistic football simulator on the market today. Speaking as a football fan, this one game alone justifies my purchase of an Amiga. But please don't tell my wife I said that. I told her the Amiga was for business—she hates football.

Hints

It goes without saying that you should understand the game of football before tackling this game. The diagrams supplied with the game help you visualize where each player should go, given an particular play, but to become proficient you should spend some time in the practice area of *Gridiron!*. The play diagrams show where the players should end their assignments, but accurate timing is just as important in the game as it is on the real field.

The Hail Mary pass is normally reserved for desperation plays near the end of the game. Apparently the computer is programmed to think this way too, so your chances of completing the pass are much better if you call the play earlier in the game. In fact, I've found it just as useful and no more self-destructive than any other pass play if played before the two-minute gun sounds.

I've found that pass defenses which employ man-to-man contact are more effective against the computer than simple zone protection. Also, since most of the plays packaged with the game tend to run or pass right, I found defenses which covered the offensive player's right side were more effective than others. The one exception is 61 Stunt Defense, which is very effective when the computer is attempting either a swing or screen to the right. This almost always results in the loss of yards or even a fumble.

On defense, if you can tackle the running player square on at full speed, the chances of him fumbling the ball greatly increase. By the same token, avoid straight on tackles when you are controlling the ball.

My favorite running plays are the sweeps. After the quarterback has handed off to one of the backs, the back can pass even though the called play is a run. If you find your back with no place to run, you can command him to pass just like an option play—but be careful that no linemen are downfield. This is a great way to get some quick yards if you command the back to pass quickly, otherwise you are in for a penalty.

Don't attempt to redesign the playbook's plays until you are familiar with the game. Creating a new playbook does not affect the original and you can always go back to it, but my early experience with designing plays yielded disasters.

Saturday Night Software

Continued from pg. 69

ple, computers are still intimidating. If you drag them over to the computer and force them to have fun, they'll look for the first opportunity to refresh their drink.

Don't make the computer the center of attention. Stick it in a corner somewhere, boot up a program, and walk away. Eventually somebody will discover it and a crowd will form. If you have baby boomer friends who grew up on television, they'll be attracted to virtually anything on a glowing screen.

Put a note by the computer saying that no drinks are allowed anywhere near it. If you don't think a Diet Pepsi can do a lot of damage, pour a can into your disk drive sometime. It's not a pretty sight. For similar reasons, hide all your other disks. You don't want some drunk reformatting your Great American Novel for kicks. If possible, put your disk drive out of the way completely.

Rule #9 Software Doesn't Get Loaded, People Do

Which drinks are most popular in the summer? What does Faith's husband Ralph like to drink? What's the recipe for a Bermuda highball? And how much booze do I need to make 13 of them?

These are just a few questions you can ask of the ultimate party program, Concept Development Association's *Mr. Boston Official Micro Bartender's Guide* (Commodore 64). The program contains over 1,000 drink recipes. In Ralph's case, you would have typed his favorite drink into the program the first time he visited your house. After that, any time Ralph comes over, the computer spits out the appropriate recipe. With this party-planning feature, you can type in your entire guest list and the computer prints out all the appropriate recipes, ingredients, and even the glassware you'll be needing.

Let's say Ralph brings along six friends who each want a vodka tonic. No problem! *Mr. Boston* will instantly recalculate the recipe for the larger amount. The program makes it possible to size a recipe from one to 999 servings (in case Ralph and his friends really get carried away).

If your computer is driving you to drink, you might as well do it the high-tech way, right?

Rule #10 Carry on the Crusade

Okay, it's time to tell the truth. We admit it. We're not suggesting you throw computer parties because they're fun. There's a deeper, darker reason.

Our real mission is to introduce the non-computing world to computers. The hardware companies can't seem to do it. The software companies haven't done it. When it comes right down to it, it's up to regular people like you and me to do it. Today, ten years after the personal computer first appeared, only 15% of American households own one.

Word of mouth is more powerful than any ad campaign. The real joy is when you can take people who have never touched a computer, draw them into it without pressuring them, and have them discover on their own how much fun computers can be. *That's* how we'll get our non-computing friends to see the light.

Think about it. You may be responsible for making someone into a new computer lover. ■

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ROBOT RASCALS

Continued from pg. 12

Up until then, we were getting along fine by simply using the on-screen prompts and joystick-activated options.

I give the game high marks for the inclusion of multiple game levels (energy levels), a wide variety of robots to choose from, easy-to-master screen prompts, fast input response, and entertaining graphics and sound effects. *Robot Rascals* is unlike any other computer game I've seen. It is nonviolent (a rare virtue absent in most games), brings human players together (a goal more games should attempt), and successfully crosses the age barrier. Yet it is challenging, easy to manage and, above all, fun. If you're looking for a game the family can play together, *Robot Rascals* is it. C

Hints

Because energy is critical, the more you possess the more you can accomplish. If you are a novice, persuade your opponent to allow you the maximum energy level while he or she uses a lesser amount.

Don't hesitate to steal. Sometimes it is smarter to reserve your energy and let your opponents do all the work finding all the objects and then you come along and simply steal the ones you need.

When picking up objects, be careful because some are helpful while others drain your energy (scan, teleport, steal). Often it is wiser to pick up helpful items (free teleports, extra energy, shields) even if you don't need them to win. Use them to help you find the required objects, then simply discard them as you find the objects you need. Then rush home.

By the same token, since some of the artifacts your robot may be required to find may be bad, look for them last—that way they won't make your mission any more difficult than needed.

Always go for the extra shield artifact. With it you can protect the important items you find from being stolen by other sticky-fingered robots.

Above all, don't take the game too seriously—the cards you draw from the deck are completely by luck. But remember that luck tends to balance out in the long run. Therefore, if your luck is running good at the beginning of the game, try to win quickly before the cards turn against you. If your luck starts off sour, try to prolong the play until luck swings your way. C

HIJINX

Continued from pg. 39

you always got him in trouble.

For you true Infocom fans (like myself), *Hollywood Hijinx* has many tricks that will leave you laughing. For instance, if you try to move the Persian rug in the living room, the game will respond with "You move the rug but don't find any trap door. Amidst your sorrow, you return the carpet to its original splendor." This is a throwback for all those who found a trap door under the rug as in *Zork*.

Now, finally, some meaty hints for you cheaters who look to game reviews for the way out of a sticky situation. I am no better myself. The difference is that I had to call Infocom to get a major hint that sent me on to a tidal wave of information. As told to me by the people at Infocom, the first hint should be pointed out to potential gamers because it is the major stumbling block with *Hollywood Hijinx*. So here goes.

All Infocom games come with product-related toys to either help the gamer or make the package more interesting. *Hollywood Hijinx* comes with a copy of Aunt Hildegarde's will, a copy of *Tinsel Town* magazine, the photo and poem of Buddy Burbank, and a lucky palm tree swizzle stick. The key to getting in the front door to the house involves the poem. Examine carefully the statue of Buck Palace outside Hildebud and examine the words of the poem. Together, you will have the answer to getting into Hildebud.

It is up to you whether you map out the Hedge Maze. I would strongly suggest mapping out every area you enter and writing down the objects included there. The house is notorious for sending you on wild goose chases.

Save the game frequently. There is one time in particular that you cannot reverse your actions. It involves going down the stairs at the Top Landing. Make sure you save the game then. You'll see why. Above all, be careful in places in which you are unfamiliar with the surroundings.

Finally, some quick tips for the gamer on the move. Examine the piano and fireplace carefully. Also, watch your step on the stairs. Experiment with the buttons on the dome in the Game Room and always check your mail. That should be enough to keep you going. These few will open up many doors for you and will take you towards earning your rightful inheritance. C

Real Life in a Box

Continued from pg. 73

grams on their shelves which for some reason or another haven't grabbed the buying audience's attention. During the interview, Hawkins mentioned three of Electronic Arts' sleepers. Having spent time with all three, I was surprised they weren't among the company's better sellers. The first was *M.U.L.E.*, which, according to Hawkins, has become a sort of cult classic among some users, but has been overlooked by most 64 owners.

The second is a sort of family version *M.U.L.E.* called *Robot Rascals* (see the review in this issue). Again I was surprised, because it is a family involvement game and is my five-year-old son's favorite. The last, *Instant Music*, is described by Hawkins as "an undiscovered diamond in the rough. One magazine editor called it the greatest program in history. It's a program which really boggles my mind. I get a lot of pleasure out of playing with it and showing it to my friends. I think programs like it, which take advantage of the fact that most people want to

"I can even envision developers hiring top actors like Robert Redford and Jane Fonda to appear in their software products."

create music but don't have the technical ability to play an instrument, are the kind of products the industry needs. It's a fabulous program. It just hasn't been discovered."

The future, Hawkins predicts, will be filled with more powerful computers which are easier to program and easier to use.

"We look forward to there being a standard hardware technology which has terrific audio-visual power, yet is inexpensive and made by several different manufacturers. There's a very good chance that could happen with CD-I (compact disc interactive). If I could describe it, it would be like an Amiga computer with a compact disc player built-in. It could do all the Amiga does, but you would still have room for digital sound and really nice animation and graphics. In addition, the same box could be used to play audio high-fidelity compact discs and also MTV-style videos with digital sound. All in the same box.

"That's pretty exciting in itself, but then if they're manufactured by a lot of different companies it's got a better chance of being successful. The bigger the possible audience for software, the more money you can risk developing really great products. A huge, standardized audience would make it possible to spend the kind of bucks movie producers spend to bring features to their audiences. Hopefully, that's what the future holds.

"With a really big audience, say 50 million owners of the same system, software developers might spend millions of dollars to bring a product to market. Even if the price of the software dropped to say the price of a record, eight or ten dollars, you could still make a profit because the end user market would be so large. I can even envision developers hiring top actors like Robert Redford and Jane Fonda to appear in their software products. They could go out and shoot video footage, then go back and digitize the frames of animation and put the sound effects in. Then when someone bought it, they would actually be getting an interactive movie with Robert Redford. I really expect that sort of thing will happen in the future.

"We expect to support important new formats as they come about, such as CD-I, which we expect to be in the marketplace by the latter half of 1988."

The fact that the hoped-for CD-I dream machine is similar to today's Amiga is the reason Electronic Arts was so quick to support that system. At this writing, no other single software distributor begins to match the line-up of Amiga software offered by Electronic Arts in both variety and quality. Their *Deluxe Paint II* graphics program has already been labeled a classic. I've compared it with the top graphics software on other systems and found it out-performs all in speed, ease of use and power, yet is cheaper.

"We really believe that the future technology in the industry is going to be similar to the Amiga—a very audio-visual system," said Hawkins. "We believed the Amiga would be a successful machine, but beyond that, we believed other computers would come along which were very similar to it. So we felt we could get a head start on the future by making products available for the Amiga. We still feel that way about the Amiga. The investment in creativity software for that system has paid off very well."

The *Deluxe* series has been embraced by both novice and profes-sional users alike. I assumed the programs had been targeted for the business community and had been adopted by the casual user, simply because they were affordable. I was wrong. In fact, according to Hawkins, the reverse is true—they were designed for personal use but were adopted by professionals because of their power.

Hawkins explains how this came about. "We want to bring really good home use products to the market. If they are good enough for business, that's great. But we want to keep the price down so the individual can afford them. *Deluxe Paint* was designed for our own in-house use. But people kept coming up to me saying it should be marketed. They were right, it's been a very successful product.

"We want to push the industry, to be innovative," says Hawkins. "We want to introduce new ideas into the market. Things like packaging need to be standardized, like the record industry has done. Early on we noticed that many of the packages being used for software weren't very effective either for the user to store or retailers to display. We introduced the album format which solved both those problems. Since then, many of our competitors have adopted the same format. We don't mind that because we believe if the industry would standardize on certain features, it would be easier to make progress. We need to move in that direction."

Along with his dream for the development of CD-I systems marketed by several different companies, Hawkins also wants the industry to adopt standards which would make life better for both the producers of software and the end user as well. He hopes to use Electronic Arts' position in the industry to initiate some of those changes.

If you want to get a software producer's attention, all you need mention is software piracy—Hawkins is no exception. The problem and possible solutions have been kicked around as long as commercial software has been available, but Hawkins' ideas cast some light on a shady issue.

"To be perfectly honest, software piracy is a very big problem. I got a letter from a fellow describing a company in Singapore offering all kinds of programs for sale which violate copyright laws. This fellow was writing to warn me of the potential danger this company

posed. I saw an ad from another company in Canada which was offering software as rentals. But after the rental period had expired, you were supposed to delete the programs but not return the disk. Well, obviously, they were making illegal copies. Some users don't realize they are breaking the law when they make copies of software, but others know perfectly well they are making illegal copies and break the law anyway. It's a common problem.

The fact that the hoped-for CD-I dream machine is similar to today's Amiga is the reason Electronic Arts was so quick to support that system.

"We want to be here in the future. In fact, we want there to be a future. This could destroy the industry, so yes, we are very concerned about piracy. That's why we have protection schemes, and they work pretty well. I wish they weren't necessary, but they are.

"The only reason people think they should have a backup copy of their software is because it is technically possible. I have an automobile, but I don't have a backup copy of it. When it fails, I'm out of luck a couple of days while the mechanics repair it. You don't see people arguing that every automobile should come with an exact duplicate backup automobile or that they should have the ability in their garage to make an exact duplicate. It's just not possible, so people don't think about it. But because it's possible to make software backup, then they feel they have a birthright to get a free backup copy. That's crazy. Your rights as a human being should have nothing to do with the technical feasibility. The solution to all this is to make software indestructible by using compact disc. Then there would be no debate for the need of a backup copy.

"To give you an example of how widespread the problem is, consider our all-time bestseller program, *One-On-One Basketball*. We probably sold 300,000 copies of that program, but there are probably a million illegal copies out there. Everyone has it or has played it. Maybe all of those people wouldn't have bought it if they hadn't gotten an illegal copy, but probably half of those would."

With the cost of hard disk storage devices beginning to approach affordable prices, the issue of copy protection takes on new meaning. Hawkins says Electronic Arts recognizes the problem and has two solutions for hard disk drive owners who use any of Electronic Arts' creativity or productivity software. At the present, most of their software can be saved to a hard disk, but requires the presence of a key disk (the original program disk) to load properly.

The second solution is an option to purchase (at an increased price) the rights to a completely unprotected program disk. *Deluxe Paint II* is an example. The current version can be copied but requires the original disk present when loading. Or if you prefer not to have to key-in the disk, you can purchase a protection-free version for a fee of $20.

Many people argue that software is overpriced. Hawkins disagrees and points out that less than two dollars is returned as profit to Electronic Arts on most of their products which retail for $40. Hawkins continues, "People question whether software prices will come down or go up. But actually, if you compare the quality and quantity of code in a software product, the price has come down. For instance, the program *The Bard's Tale* which retails for around $40 has a lot more code in it than a program selling for that price a couple of years ago. And the programs today have at least 30 or 40 hours of entertainment. So when you look at it that way, the value has gone up while the prices have stayed the same."

Hawkins ended the interview with some good advice for all of those who are wearing out light bulbs programming into the wee hours of the night—keep it up. "Developing software has been and will continue to be a great career. If you develop any technical skills in programming, that's a very marketable skill. Plus, it's a good thing to do to increase your intelligence."

I must admit, Trip Hawkins doesn't look like any pioneer I ever imitated in my childhood. But times, dress codes and frontiers have changed more than just a little since the early pioneers explored America's forest of opportunities. Today's frontiers are just as exciting and challenging as the rivers and ridges our ancestors conquered. So the next time you pass a mirror, take a glance. Chances are you'll see another pioneer. C

Carver Gang Still at Large

Continued from pg. 77

shops on a certain date. Then they contacted the "hawks" and "doves" of the London area and got them stirred up. In the meantime, these people bought some red T-shirts and had the title of our game printed across them. It's hard to believe, but they actually got some people to wear the t-shirts and picked the Russian Embassy in London for additional press coverage.

For a couple of weeks, *Raid Over Moscow* was featured on nightly television newscasts. It was the topic of radio interviews and continued to appear in the London newspapers. British computer shops couldn't keep the product in stock for a short period of time. We, on the other hand, had no knowledge of what was happening in England. Once we found out about their campaign, it was already too late. We told U.S. Gold to let things calm down. They agreed to honor our wishes, but they still thought the whole incident was just an amusing ploy to sell the product.

Raid Over Moscow sold well in America, the United Kingdom and Europe. In fact, it did better abroad than we had anticipated. Is it possible that all of this negative press actually sold the program or did the product sell itself? Whatever the case, we didn't receive any negative mail on the subject at all.

Jermaine: Why did you create *Beach Head II?*

B. Carver: Our followers wrote so many nice letters requesting another *Beach Head* game that we felt obligated to give them one. About 14 months had elapsed since *Beach Head* had made its appearance, so the timing was right for a sequel.

R. Carver: Access had also placed itself within a war game loop. Since *Beach Head* and *Raid Over Moscow* had been our most successful programs to date, we felt that the public wanted more military action games.

Jermaine: How did you begin programming *Beach Head II?*

R. Carver: The final challenge of *Beach Head* involved storming the dictator's fortress. When I started working on *Beach Head II,* I knew the story had to begin where *Beach Head* left off. I came up with the idea that the dictator had somehow survived the assault on his stronghold and escaped with some hostages to the interior of the island.

We began the project by creating a scrolling sequence where a helicopter is dodging fire from a series of island defenses and tanks. I didn't put this segment at the beginning of the program for two reasons. First of all, this sequence was tough to master. Many of our customers would become frustrated with this challenge and could lose interest in the game entirely. And secondly, any helicopter scene would automatically be associated with a rescue of the hostages. Now, we couldn't rescue those poor fellows in the opening of the program now could we? During the final days of putting the game together, we christened this challenge Escape! and made it the third portion of the project.

Jermaine: How do you create your games at Access?

R. Carver: Before we begin a project, Bruce, Chris Jones and I go through a series of brainstorming meetings. We lock ourselves in a room for hours, writing down any ideas that come to mind on a large chalk board. Sometimes we begin defining a single scene and expand on things from there. At other times, we lay out the basic graphics of each screen and discuss possible ways of adding action to each picture. So much laughter is generated during one of these sessions that we usually arrive home wet-eyed and hoarse.

> "At a critical point in Beach Head II, one of the gentlemen was going to say 'duck' and if either figure bent down, a quacking duck would fly across the top of the screen."

From this ton of raw ideas, only about 5% of them will be used in the program we're working on. At best, many of the prime elements in that project are probably off-shoots from earlier thoughts that simply hadn't worked out. As the program progresses, someone will undoubtedly encounter an unsolvable problem. When this happens, we meet again to examine every possible alternative that might take care of the matter. We're in business to give you the most product for your money, so please remember that when we promise a program in July and deliver it in October.

Jermaine: Did you reject many ideas you had for *Beach Head II?*

R. Carver: As usual, we had several interesting concepts for *Beach Head II* that simply didn't pan out. After the scrolling Escape! scene, we had planned to have the helicopter confront a solid wall containing a system of defenses. The player would have the option of destroying armed enplacements or avoiding them while dodging the return fire. In the meantime, you could scroll vertically and horizontally along the wall looking desperately for a heavy metal door. Once the door was located and blown open, the whirlybird could progress into another scene taking place within another fortress.

This scheme sounded good, but the copter was supposed to be getting hostages off the island instead of placing their lives in danger. After looking things over for a while, there was just no logical way to incorporate this scene into the current sequence of events we had already constructed for the program.

Sometimes extra graphic features enhance a strategic scene, but we can't always add these things. *Beach Head II* was no exception. In the final challenge of the game, the player finds himself engaged in a knife-throwing duel with the evil dictator. At a critical point in this test of courage, one of the gentlemen was going to say "duck" and if either figure bent down, a quacking duck would fly across the top of the screen. We also considered having an alligator in the pool which separates you and your foe. If the bad guy was defeated, he would fall into the pool where the alligator would eat him. This would have been an interesting conclusion to this quest for justice and revenge, but it would have also closed the door on any possible sequels to *Beach Head II.* By the way, we don't have a *Beach Head III* on the drawing board at this time.

Jermaine: How did you acheive the realistic speech used in *Beach Head II?*

R. Carver: From the beginning of *Beach Head II,* we'd talked about incorporating speech into the software. The 1985 January CES show in Las Vegas brought us together with Doug Mosser. He is the president of Electronic Speech Systems, based in Berkeley, California. We spent a lot of time together at the convention, discussing how they created distinct voice reproduction, the percentage of processor time it uses, and the amount of memory a catalog of spoken words would occupy. Bruce and I had already

seen samples of Electronic Speech System's work. Epyx's *Impossible Mission* contained the quality of voice we wanted to use in our program.

After looking over the facts and figures Doug had given us at CES, we determined it was feasible to put this type of speech in our new program. We contacted Electronic Speech Systems again and arranged to create some sample spoken words. Bruce and I wanted to see how hard it was to incorporate them into our interrupt system of programming. The actual voice used in *Beach Head II* belongs to Doug Vandergrift, the person responsible for much of our packaging artwork.

B. Carver: The main reason we were able to put speech into *Beach Head II* was because of our careful planning. I kept compacting code, trying to save as much memory as possible. In the meantime, Roger and I calculated we would need about 20 to 30 words for the program. Once they were converted to code, we put them into two speech files (each of which were approximately 16 pages long). Then we had to write a driver module that contributed another six to eight pages of data. The entire speech mechanism of *Beach Head II* added up to about 6K of memory, which I had saved during many hours of compressing the code.

Using voices in the program does slow down the action on the screen somewhat because it requires about 50% of the processor time. Whenever a man is hit by fire in the first sequence of the program, his yelling causes the sprites to flash a little bit. I didn't think this mattered because the game remained very playable. The presence of speech in our game made the product more convincing and realistic, but looking back, it bordered on being a bit too realistic for some of our customers.

> "I believe the voice in this segment of Beach Head II bordered on being too realistic for some of our followers."

R. Carver: After we completed the scrolling helicopter Escape! challenge, we were working on events taking place before and after the hostages had been rescued. The player would demand the hide of the dictator, so we put together a final one-on-one confrontation in a hidden cavern beneath the fortress. You and the dictator must accurately throw knives at each other and dodge ones thrown by your opponent. Again, I believe the voice in this segment of the program bordered on being too realistic for some of our followers. Maybe we should have made two versions of the game for our customers or put a warning on the package saying that it might not be suitable for certain members of the family.

Beach Head II is also the only true two-player game we've created. There are only a few programs on the market that allow two opponents to sit down and play against each other simultaneously. The program also contains a computerized foe to fight when you're alone. One of the hardest parts of the project was giving both factions separate but equal powers.

The machine gun was an interesting component for the game, but we can't take credit for the basic concept. Bruce and I went down to a local arcade and noticed that one commercial game featured the player protecting something from a number of other elements in the game. We liked that idea. In the end, we spent many hours creating a believeable machine gun that would protect the hostages in the second section of the program (Rescue).

Jermaine: Is *Beach Head II* the final military action game we'll see from Access?

B. Carver: We haven't planned any new ones. *Beach Head II* was the best game we had developed up to that point in time. It contained superior speech, fresh new game challenges, interesting graphics, and a two player one-on-one option. Despite all of these pluses for the program, *Beach Head II* didn't sell very well. We have no idea what went wrong.

Personally, I believe that war games might have run their course in 1985 and the public was looking for fresh new forms of entertainment. If my theory is correct, it would explain the sudden rise in popularity of Kung Fu, breakdance and Olympic-related software. All things being considered, Roger and I learned a lot as we developed *Beach Head II.*

Stay tuned for part two of this exciting look behind the scenes at Access Software. C

Continued from pg. 46

have failed, since you don't want to repeat the same mistake twice.

Because each game consists of several rounds plus bonus play and passing is permissible, the smart player will pick and choose his answers carefully. Sometimes it is better to pass and hold onto a word until the last round in hopes of getting a chance to play a bonus round rather than allowing your opponent that chance. On the other hand, if you pass and your opponent uses the word you were saving, you could end the game with only tear stains on your keyboard.

The game's sound effects are simple. When a key on the console is pressed, the corresponding key on the screen typewriter moves and makes the sounds of a manual typewriter. You'll hear only a few buzzers and whistles here—nothing to write home about, but enough to create the correct atmosphere for a word game.

The display includes a redefined character set with which I found one fault: I had difficulty telling the difference between the screen letter D and O. More than once, I lost points trying to come up with a seven-letter word beginning with D when I should have been looking for a word beginning with O.

Buzzword is not marketed as an educational program, but I suspect many teachers and parents who see it will be tempted to sit children down at the keyboard to make them learn. Please resist that temptation. Yes, *Buzzword* has some educational values. It's definitely more stimulating than running from computer-controlled ghosts down dot-splattered corridors, but don't mention that to your children. At my home, the surest way to turn the children off to the computer is to equate it with schoolwork. I simply let my kids enjoy *Buzzword* and if something beneficial rubs off, well what the heck.

I always try to give some hints on how to win the games I review, but with *Buzzword*, it's a little difficult. To have a chance at winning you must be able to spell the words you use, so study or keep a dictionary on hand. But I found that duplicating the information from the cards onto inconspicuous parts of my body as well as the soles of my shoes helped tremendously. Thus, while my opponent was concentrating on the screen, I concentrated on my cheatsheet. (I hate that word cheat. I refer to the cheatsheet as a logical winning aid.)

I have a humorous story that involves *Buzzword*. A friend came by the office one day to talk computers with me a couple days after I received the game. He wanted my advice on buying a system. I asked him what he intended to use the computer for, since some computers are better suited for specific applications. Of all the reasons he wanted a computer, the one thing he was sure he didn't want it for was to play games—he turned his nose up at the mere mention of computer games. But while I was showing him the different systems, I booted *Buzzword* just to tease him. Two hours later when I tried to close the office, he was still sitting in the corner—laughing and cursing!

The introduction in the user's manual calls *Buzzword* "a puzzle, a word game, a trivia game, a strategy game, but best of all, a fun game." I agree with that. ■

THE 128 MODE

Continued from pg. 96

```
120 GRAPHIC 1,1:UG=5'CHPA
130 FOR UC=1 TO UN+UG'EHLC
140 UQ=UC-UG:IF UQ<0 THEN UQ=0'GNEG
150 UU=UX(UC):UV=UY(UC)'CRGG
160 IF UU=0 OR UX(UC-1)=0 THEN
    180'GOPI
170 DRAW 1,UX(UC-1),UY(UC-1) TO UU,
    UV'EWTK
180 DRAW 0,UX(UQ),UY(UQ) TO UX(UQ+1),
    UY(UQ+1)'EFHN
190 NEXT'BAEE
200 UG=UG+3:GOTO 130'DJEA
```

END

Listing 4 Sprite Data

```
10 FOR T=0 TO 63:READ A$
   :POKE 3584+T,DEC(A$):NEXT'ITBF
20 BSAVE"SP.HAND",B0,P3584 TO
   P4096'CPGE
30 DATA  00,00,18,00,00,3C,00,00'BXND
40 DATA  74,00,00,E8,00,01,D0,00'BXSE
50 DATA  03,A0,00,75,40,00,EE,38'BXQG
60 DATA  03,5C,FE,07,39,FF,0F,75'BXSH
70 DATA  57,18,E0,2F,1D,C0,FF,08'BXJI
80 DATA  7F,FF,0B,BA,FF,03,BB,F8'BXPJ
90 DATA  0B,7F,00,10,00,00,20,00'BXHJ
100 DATA  00,00,00,00,00,00,00,00'BXHY
```

END

GETTING IT STRAIGHT

Continued from pg. 61

```
340 CIRCLE 1,160,Y/2,40,40'COOF
350 CIRCLE 1,160,Y/2,80,80'COWG
360 DRAW 1,80,Y/2 TO 240,Y/2'ENVI
370 DRAW 1,160,Y/2-80 TO 160,
    Y/2+80'GSBM
380 :'ABHF
400 FOR I=10 TO Y STEP Y/2-30'GIAD
410 BOX 1,10,I,50,I+40'CNOD
420 BOX 1,270,I,310,I+40'CPRE
430 NEXT'BAEB
440 :'ABHC
500 CHAR 1,8,22,"+ TALLER
    DISPLAY"'BHGF
510 CHAR 1,8,23,"- SHORTER
    DISPLAY"'BHJG
520 CHAR 1,8,24,"Q QUIT[SPACE5]Y-SCALE
    :"+STR$(Y)'DKLJ
530 :'ABHC
600 GET KEY A$'CCEB
610 :'ABHB
620 IF A$="+" THEN Y=Y-4'FFIG
630 IF A$="-" THEN Y=Y+4'FFJH
640 LOOP UNTIL A$="Q"'DCFH
650 :'ABHF
700 GRAPHIC 0'BBOC
710 PRINT"[CLEAR]YOUR PERSONAL SCALE
    COMMAND:"'BAYK
720 PRINT"[DOWN]SCALE 1, 320,"Y'BBLG
730 END'BACE
```

END

USER GROUPS

Although there are almost 1000 known Commodore user groups nationwide and around the world, this list includes only those that have been officially recognized by Commodore as Approved User Groups. If your group would like to apply for Approved status, contact Pete Baczor, User Group Coordinator, at Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380.

Commodore user groups provide invaluable assistance to Commodore computerists. If you are looking for people who share your computing interests, or if you need help getting started with your computer, contact the group near you.

ALABAMA

Bay Minette
B-128 Commodore Users' Group (South)
P.O. Box 164, AL 36507
PET VIC 64

Birmingham
Birmingham Commodore Club
P.O. Box 59564, AL 35222

Birmingham
Commodore Club - South
P.O. Box 324, AL 35126
64 128 Amiga

Decatur Valley Commodore Users' Group
P.O. Box 835, AL 35602
VIC 64 128 Amiga

Evergreen
The Byte Bunch
318 Perryman St., AL 36401
PET VIC 64 128 Amiga PC

Florence
Shoals Commodore Users' Group
114 Van Fleet Dr., AL 35630

Gadsden
Coosa Valley Commodore Club
2800 Waters Ave., AL 35904
64 128 Amiga

Huntsville
Computeen Computer Club
10118 Shades Rd., AL 35803

Mobile
Commodore Club of Mobile
3868-H Rue Maison Road,
AL 36608

Montgomery
M.A.C.K.S.
P.O. Box 210126, AL 36121-0126
PET VIC 64 128 Amiga PC

Scottsboro
Scottsboro Commodore Users' Group
Route #5, Box 255, AL 35768
64 128 Amiga PC

Smith's
Smith's Alabama Commodore Users' Group
Route 2, Box 105, AL 36877
VIC 64 128 Amiga

Tuscaloosa
Tuscaloosa Users' Society Kommodore
P.O. Box 439, AL 35402
PET VIC 64 128 Amiga PC

ALASKA

Anchorage
Anchorage Commodore Users' Group
P.O. Box 104615, AK 99510
VIC 64 128 Amiga

Amiga Users' Group of Alaska
12936 Jeanne Rd., AK 99516
Amiga

Juneau
Juneau Commodre Users' Group
9357 Northland, AK 99801
64 128 Amiga PC

Sitka
Sitkas Commodore Users' Group
P.O. Box 2204, AK 99835

ARIZONA

Chino Valley
Prescott Area Commodore Club
1631 N. Canfield Ave., AZ 86323

Globe
Gila Hackers
Route #1, Box 34, AZ 85501
64 128

Sierra Vista
Thunder Mountain Commodore Computer Users' Group
P.O. Box 1796, AZ 85636
VIC 64 128 Amiga PC

Tempe
Arizona Commodore Users' Group
P.O. Box 27201, AZ 85282

Tucson
Catalina Commodore Computer Club
2634 E. Malvern St., AZ 85716
VIC 64 128 Amiga PC

ARKANSAS

Fort Smith
Commodore Computer Club of Ft. Smith
P.O. Box 6000, South Station,
AR 72906

North Little Rock
River City Commodore Computer Club
P.O. Box 4298, AR 72116
64 128 Amiga PC

Pine Bluff
Commodore Computer Club of Pine Bluff
P.O. Box 1083, AR 71613
64 128 Amiga

CALIFORNIA

Alta Loma
CACTUS
P.O. Box 1277, CA 91701
PET VIC 64 128

Anaheim
20/64 Group
2170 W. Broadway, Suite 529,
CA 92804-2446

Antioch
The Commoodre Connection Users' Group
3210 Tabora Dr., CA 94509
VIC 64 128

Arcadia
Pasadena Commodore Computer Club
P.O. Box 1163, CA 91006
PET VIC 64 128 Amiga PC

Auburn
Auburn Commodore Computer Club
P.O. Box 4270, CA 95604
PET VIC 64 128 Amiga PC

Bakersfield
ABACUS
P.O. Box 3415, CA 93385
PET VIC 64 128 Amiga PC

Concord
Diablo Valley Commodore Users' Group
P.O. Box 27155, CA 94598
64 128 Amiga

Denair
Valley Computer Club
P.O. Box 310, CA 95316
PET VIC 64 128

Hollywood
Hollywood Users' Group
P.O. Box 38313, CA 90038
64 128 Amiga PC

Huntington Beach
West Orange County Commodore Users' Group
20311 Ravenwood Lane, CA 92647
64 128

Laguna Hills
South Orange Commodore Klub
25401 Champlain Rd., CA 92653

Long Beach
Commodore Helpers
3736 Myrtle Ave., CA 90807

Los Angeles
Los Angeles Amiga Users' Group
1711 Altivo Way, CA 90026

Monterey
Plus/4 Users' Group
P.O. Box 1001, CA 93942

Napa
Napa Valley Commodore Computer Club
P.O. Box 2324, CA 94558
VIC 64 128

Oceanside
Oceana-64
1004 Plover Way, CA 92056
64 128

Paso Robles
Simply Users' of Computers
301 Veronica Dr., CA 93446
PET VIC 64 128 Amiga PC

Point Magu
Point Magu Users' Association
P.O. Box 42360, CA 93042-0360

Redding
C.O.U.G.A.R.
2776 Helen St., Apt. A, CA 96002
PET VIC 64 128 Amiga PC

Riverside
Moreno Valley Commodore Users' Group
P.O. Box 5494, CA 92517
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Rosemead Associate Members
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64 128

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P.O. Box 13393, CA 95813-13393

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Santa Barbara Commodore Users' Group
4520 Via Vistosa, CA 93110

San Bernardino
Club 64
P.O. Box 514, Patton, CA 92369-0514
VIC 64 128 Amiga

San Diego
San Diego Commodore Users' Group
P.O. Box 86531, CA 92138-6531

San Jose
64/More Commodore Users' Group
P.O. Box 26811, CA 95159-6811
VIC 64 128 Amiga PC

San Luis Obispo
San Luis Obispo Commodore Club
P.O. Box 3836, CA 93403-3836

San Rafael
Marin Commodore Computer Club
665 Las Colindas Rd., CA 94903
VIC 64 128 Amiga

Santa Maria
Central Coast Commodore Users' Group
4237 Plumeria Ct., CA 93455
VIC 64 128

Santa Rosa
Santa Rosa Commodore Users' Group
333 E. Robles Ave., CA 95407-7971
64 128 Amiga

Stockton
Stockton Commodore Users' Group
1911 Comstock Dr., CA 95209
VIC 64 128

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Southern California 64 Users' Group
3852 Riverton, CA 91604

Thousand Oaks
Simi Valley Commodore Users' Group
1586 Glenbrock Ln., CA 91320-1805
64 128 Amiga

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Ventura Commodore Club
6464 Shearwater St., CA 93003
VIC 64 128 Amiga

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South County Amiga Users' Group
13712 Claremount St., CA 92683
Amiga

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Colorado PET Users' Group
676 S. Quentin St., CO 80012

Colorado Springs
Commodore Club 4058 Baytown Dr.,
CO 80916
PET VIC 64 128 Amiga PC

Ft. Collins
Ft. Collins C3
1660 Shenandoah Cir., CO 80525

Grand Junction
Western Slope Commodore Users' Group
P.O. Box 4142, CO 81502-4142
64 128

Greeley
NorCoCom
2138 1/2 - 10th St. Rd., CO 80631

Lakewood
Commodore Condor Club
1680 Lewis St., CO 80215

North Glenn
Colorado Commodore Computer Club
11855 Adams St., CO 80233
PET VIC 64 128 Amiga PC

CONNECTICUT

Bristol
Bristol Commodore Users' Group
CompuTech Systems, 178 Pine St.,
CT 06010
64 128

Danbury
Fairfield County Commodore Users' Group
P.O. Box 212, CT 06813
VIC 64 128 Amiga

East Hartford
Hartford County Commodore Users' Group
P.O. Box 8553, CT 06108
VIC 64 128 Amiga

Hebron
Eastern Connecticut Commodore Users' Group
227 Jagger Lane, CT 06248

Meriden
Silver City Commodore Club
70 Webster St., 1st Floor, CT 06450
VIC 64 128

North Haven
Greater New Haven Commodore Users' Group
P.O. Box 796, CT 06473
VIC 64 128 Amiga

Stamford
Stamford Area Commodore Society
P.O. Box 1337, CT 06904

Vernon
Capitol Area Commodore Club
P.O. Box 2372, CT 06066

Waterford
Millstown Users' Group - 64
Sillin Nuclear Training Center,
P.O. Box 128, CT 06385-0128
64 128 Amiga

DELAWARE

Lewes
Lower Delaware Commodore Computer Club
R.D. #2, Box 52-A, DE 19958

DISTRICT of COLUMBIA

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USO Computer Club
207 Beyer Rd., S.W., DC 20032
64 128 Amiga PC

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Beverly Hills
Citrus County Commodore Club
P.O. Box 503, FL 32665
PET VIC 64 128 Amiga PC

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Manasota Commodore Users' Group
916 E. 35th Ave. Dr., FL 33508

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P.O. Box 798, FL 34297-0798
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Daytona Beach
Daytona Beach Amiga Computer Enthusiasts
P.O. Box 10204, Westside Station,
FL 32020
Amiga

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P.O. Box 375, FL 33441
64 128

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Commodore Computer Club
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Lakeland Police Users' Group
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Space Coast AMIGA Users' Group
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Miami 2064
11531 SW 84th St., FL 33173-3622

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VIC 64 128

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PET VIC 64 128

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VIC 64 128 Amiga PC

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Titusville Commodore Club, Inc.
890 Alford St., FL 32796
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Albany Commodore Amateur Computer
P.O. Box 5461, GA 31706-5461

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Athens Commodore Enthusiasts-(ACE)
130 St. James Drive, GA 30606

Atlanta
Amiga Atlanta
Box 7724, GA 30357
Amiga

Augusta
Commodore Club of Augusta
P.O. Box 14337, GA 30919
VIC 64 128 Amiga

Calhoun
R.C. Creations Users' Group
177 Flora Dr., S.W., GA 30701
VIC 64 128

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Commodore Users' Group of Atlanta
633 Clairmont Cir., GA 30033

Forest Park
Clayton County C-64 Users' Group
6379 Bimini Drive, GA 30050
PET VIC 64 128

Lilburn
Stone Mountain Users' Group
P.O. box 1762, GA 30247
VIC 64 128 Amiga

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SCUG C/O
103 Virginia Avenue, GA 31404

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Byte-After-Byte
NAS Barbers Point, 2041C Roosevelt Avenue, HI 96707

Honolulu
Advanced Users' Group
1001-B Signer Blvd., HI 96818
64 128 Amiga

Honolulu
20/64 Hawaii
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Blackfoot
Blackfoot Users' Group
760 Janet Street, ID 83221

Idaho Falls
Eagle Rock Commodore Computer Club
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Jerome
PFP 64 Software Exchange
742 E. 19th, ID 83338
64

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VIC 64 128

Pingree
The Blackfoot Users' Group
417 South 1200 West, ID 83262

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P.O. Box 1347, IL 62002-1347
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Ashkum
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Bloomington Normal Commodore Users' Group, Inc.
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Canton
Canton Area Commodore Users' Group
13 N. 17th Ave., IL 61520

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Suburban Commodore Users' Group
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PAPUG
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833 Prospect, IL 60120
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904 Fifth St., IL 61540

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Western Illinois Commodore Users' Group
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64 128

North Aurora
Fox Valley 64 Users' Group
P.O. Box 28, IL 60542
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Capitol City Commodore Computer Club
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SPUG Computer Club
3116 Concord, IL 62704
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Champaign-Urbana Commodore Users' Group
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PET VIC 64 128 Amiga

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Anderson Commodore Users' Group
P.O. Box 940, IN 46015

Bloomington
Bloomington Commodore Users' Group
800 E. Atwater, IN 47405

Evansville
Commodore Computer Club
P.O. Box 2332, IN 47714
VIC 64 128 Amiga PC

Fort Wayne
Fort Wayne Area Commodore Club
P.O. Box 13107, IN 46867
VIC 64 128 Amiga PC

Greenfield
C.H.U.G.
1322 Fairview Drive, IN 46140

Indianapolis
Indy Commodore Computer Club
P.O. Box 11543, IN 46201
VIC 64 128 Amiga PC

Kokomo
Kokomo Commodore Computer Club
6016 Yale Court, IN 46902

LaPorte
Commodore Users' Group of Greater La Porte County
P.O. Box 1633, IN 46350
VIC 64 128 Amiga

Lafayette
Commodore Owners of Lafayette
P.O. Box 5763, IN 47903
64 128

Logansport
Logansport Commodore Club
2329 Myers Lane, IN 46947
64 128 Amiga

Pleasant Lake
Steuben's Commodore Users' Group
P.O. Box 25, IN 46779-0025
VIC 64 128 Amiga

Terre Haute
Western Indiana Commodore Users
P.O. Box 1898, IN 47808

IOWA

Ames
COUGAR Commodore Users' Group
P.O. Box 2302, IA 50012
VIC 64 128

Cedar Rapids
Commo-Hawk Commodore Users' Group
P.O. Box 2724, IA 52406-2724
PET VIC 64 128 Amiga PC

Davenport
Quad-City Commodore Computer Club
P.O. Box 3994, IA 52808

Deniscn
Crawford County Commodore Users' Group
519 N. 19th Street, IA 51442

Hartford
Capitol Complex Commodore Computer Club
P.O. Box 58, IA 50118
64 128 Amiga

LeMars
Plymouth County Commodore Users' Group
300 Third Ave. SE, IA 51031

Spencer
Syntax Errors Anonymous
1224 - 14th Avenue West,
IA 51301-2941
PET VIC 64 128 Amiga PC

Washington
Washington Area Commodore Users' Group
P.O. Box 445, IA 52353
64 128 Amiga

Waterloo
P.E.C.C.U.G.
333 Joy Drive, IA 50701
VIC 64 128 Amiga PC

KANSAS

Ft. Leavenworth Commodores Galore
221 Hancock, KS 66027
PET VIC 64 128 Amiga

Hays
High Plains Commodore Users' Group
1307 Western Plains Drive, KS 67601
64 128 Amiga

Hutchinson
Salt City Commodore Club
P.O. Box 2644, KS 67504-2644
64 128 Amiga

Lawrence
Lawrence Commodore Users' Group
P.O. Box 2204, KS 66045
VIC 64 128

Parsons
Parsons Commodore Users' Group
P.O. Box 822, KS 67357
64 128 Amiga PC

Wakarusa
Topeka Commodore Computer Users' Group
7939 S. Topeka Blvd., #39, KS 66546

Wichita
Commodore Users' Group of Wichita, Inc.
P.O. Box 593, KS 67201-0593
PET VIC 64 128 Amiga PC

KENTUCKY

Glasgow
Glasgow Commodore Users' Group
P.O. Box 154, KY 42141

Lexington
Commodore Users' Group of Central Kentucky
P.O. Box 55010, KY 40555
PET VIC 64 128 Amiga

Louisville
LUCKY
P.O. Box 19032, KY 40219-0032

Madisonville
Commodore Users' Group of Madisonville
P.O. Box 849, KY 42431
64 128 Amiga

LOUISIANA

Baton Rouge
Baton Rouge C-64 Users' Group
P.O. Box 1422, LA 70821

Gray
Southeast Louisiana Commodore Users' Group
P.O. Box 1138, LA 70359
PET VIC 64 128 Amiga PC

Lafayette
Acadiana Commodore Computer Club
P.O. Box 31412, LA 70503-1412

Lake Charles
Lake Charles Users' Group
5631 Lakelyn, LA 70605

Metairie
Sixty-Four 'Um
4317 Stockton Street, LA 70001

Metairie
New Orleans Commodore Klub
2308 Houma Blvd., Apt. 724, LA 70001
64 128 Amiga PC

Shreveport
Ark-La-Tex Commodore Computer Club
P.O. Box 6502, LA 71106
64 128 Amiga

Swartz
Northeast Louisiana Commodore Users' Group
P.O. Box 175, LA 71821

MAINE

Houlton
Southern Arostook Commodore Users
P.O. Box 451, ME 04730

Orono
Commodore Users' Group of Penobscot
101 Crosby Hall, U of ME at Orono,
ME 04469
PET VIC 64 128 Amiga PC

Scarborough
Southern Maine Commodore Users' Group
P.O. Box 416, ME 04074-0416

Topsham
Your Commodcre Users' Group
103 Main St., ME 04086
VIC 64 128 Amiga PC

MARYLAND

Annapolis
Annapolis Commodore Users' Group
P.O. Box 3358, MD 21403

Baltimore
Another Baltimore Commodore Users' Group
3 Hopkins St., MD 21061

Baltimore
Randallstown Commodore Users' Group
3702 Durley Lane, MD 21207
PET VIC 64 128 Amiga PC

Ft. Meade
C-64/128 Computer Users' Group
SEALANDAIR Recreation Center
9810 Emory Rd., MD 20755
64 128 Amiga

Gaithersburg
Gaithersburg Commodore 64 Users' Group
8705 Waxwing Ter., MD 20879

Hagerstown
Hagerstown Users' Group
23 Coventry Lane, MD 21740
VIC 64 128 Amiga PC

Leonardtown
PAX/COM/64
240 Jefferson St., MD 20650

Lutherville
CUM-BACC
1427 York Rd. at Seminary Ave.,
MD 21093-6014
64 128 Amiga

Rockville
Rockville Commodore Users' Group
P.O. Box 8805, MD 20856
VIC 64 128 Amiga

Silver Springs
Vic Appreciators
10260 New Hampshire Ave., MD 20903
VIC

Townson
BAYCUG
12 Wilfred Court, MD 21204

MASSACHUSETTS

Cotuit
Commodore Users' Group of Cape Code
P.O. Box 1490, MA 02635
VIC 64 128 Amiga

Fall River
M.E.M.O. Computer Club
P.O. Box 3336, MD 2722-3336
VIC 64 128 Amiga

Hathorne
World Wide Users' Group
P.O. Box 50 C/P, MA 01937

Marlboro
EM2064 Commodore Users' Group
6 Flagg Rd., MA 01752

Rockland
Rockland Commodore Users' Group
98 Myrtle St., MA 02370
PET VIC 64 128 Amiga PC

Westfield
Pioneer Valley Commodore Club
6 Laurel Ter., MA 01085

Second half of User Group Listing will be printed in the August issue

Continued from pg. 82

Listing 1 — C64 and C128

```
5 POKE 56579,255'BJKF
7 POKE 56577,0'BHBH
10 POKE 56589,127'BJJY
12 FOR X=0 TO 7'DDYB
14 POKE 56577,0:POKE 56577,1'CPKF
15 NEXT X'BBRC
20 IF(PEEK(56589)AND 8)=0 THEN 20'FNJD
30 X=PEEK(56588)'CITC
40 PRINT X;'BCSB
45 POKE 56577,2'BHDH
50 GOTO 12'BCKB
```

Listing 2 — VIC 20

```
10  POKE 37138,255
20  POKE 37150,127:REM INTERRUPT FLAG
    ENABLE
30  POKE 37147,12:REM AUXILIARY
    CONTROL FLAG
35  POKE 37136,2
40  FOR X=0 TO 7
50  POKE 37136,1:POKE 37136,0
60  NEXT
70  X=(PEEK(37149)AND 4)
    :REM SERIAL FLAG
80  X=PEEK(37146)
90  PRINT X;
95  POKE 37136,2
100 GOTO 40
```

END

Listing 3 — C64 Demo

```
20 FOR J=40710 TO 40751:READ X
   :POKE J,X:NEXT'GSUF
30 SYS 40718:POKE 56,PEEK(56)-1
   :NEW'FPNF
40 DATA 140,1,221,234,108,44,159,234,
   173,20,3,141,44'BTMI
50 DATA 159,173,21,3,141,45,159,120,
   169,6,141,20,3'BRXJ
60 DATA 169,159,141,21,3,169,255,141,
   3,221,88,96,49,234,234,0'BDBM
```

END

Listing 4 — C128 Demo

```
20 FOR J=4864 TO 4902:READ X:POKE J,X
   :NEXT'GQHF
30 SYS 4870:NEW'CFBB
40 DATA 140,1,221,108,36,19,173,20,3,
   141,36,19,173,21'BUDJ
50 DATA 3,141,37,19,120,169,0,141,20,
   3,169,19,141,21,3'BVAK
60 DATA 169,255,141,3,221,88,96,255,
   21,255'BJJJ
```

END

Listing 5 — C128 Serial IRQ

```
120 FOR J=4864 TO 4937:READ X:POKE J,X
    :NEXT'GQPE
130 SYS 4897:NEW'CFKA
150 DATA 160,8,169,0,141,1,221,169,1,
    141,1,221,136'BQJI
160 DATA 192,0,208,241,173,13,221,173,
    12,221,133,255'BSOJ
170 DATA 169,2,141,1,221,108,160,19,
    173,20,3,141,160'BSIK
180 DATA 19,173,21,3,141,161,19,120,
    169,0,141,20,3'BQIL
190 DATA 169,19,141,21,3,169,255,141,
    3,221,169,0,141'BSAM
200 DATA 1,221,169,127,141,13,221,88,
    96,0'BHWC
```

END

Listing 6 — C64 Serial IRQ

```
20 FOR J=40710 TO 40785:READ X
   :POKE J,X:NEXT'GSCF
30 SYS 40743:NEW'CGXB
40 DATA 160,8,169,0,141,1,221,169,1,
   141,1,221,136'BQJI
50 DATA 192,0,208,241,173,13,221,173,
   12,221,133,255'BSOJ
60 DATA 169,2,141,1,221,108,79,159,
   173,20,3,141,79'BRIK
70 DATA 159,173,21,3,141,80,159,120,
   169,6,141,20,3'BRWL
80 DATA 169,159,141,21,3,169,255,141,
   3,221,169,0'BPJM
90 DATA 141,1,221,169,127,141,12,221,
   88,96,0,255,74'BSEN
```

END

Listing 7 — VIC 20 Demo

```
20 FOR J=7430 TO 7468:READ X:POKE J,X
   :NEXT
30 SYS 7436:NEW
40 DATA 230,33,66,55,2,83,30,255,243,
   77,8,241,148,127,117
50 DATA 247,177,105,36,252,11,119,154,
   223,245,128,45,251
60 DATA 33,127,96,246,177,241,128,4,
   86,70,212
```

END

Listing 8 — VIC 20 Serial IRQ

```
20  FOR J=7430 TO 7468:READ X:POKE J,X
    :NEXT
30  SYS 7436:NEW
40  DATA 160,8,169,0,141,16,145,169,1,
    141,16,145
50  DATA 136,192,0,208,241,173,29,145,
    173,26,145
60  DATA 133,255,169,2,141,16,145,108,
    84,29,173,20,3
70  DATA 141,84,29,173,21,3,141,85,29,
    120,169,6,141
80  DATA 20,3,169,29,141,21,3,169,255,
    141,18,145,169
90  DATA 0,141,16,145,169,127,141,30,
    145,165,12,141
100 DATA 27,145,88,96,234,234,234
```

END

HOW TO ENTER PROGRAMS

The programs which appear in this magazine have been run, tested and checked for bugs and errors. After a program is tested, it is printed on a letter quality printer with some formatting changes. This listing is then photographed directly and printed in the magazine. Using this method ensures the most error-free program listings possible.

Whenever you see a word inside brackets, such as [DOWN], the word represents a keystroke or series of keystrokes on the keyboard. The word [DOWN] would be entered by pressing the cursor-down key. If multiple keystrokes are required, the number will directly follow the word. For example, [DOWN4] would mean to press the cursor-down key four times. If there are multiple words within one set of brackets, enter the keystrokes directly after one another. For example, [DOWN,RIGHT2] would mean to press the cursor-down key once and then the cursor-right key twice. Note: Do not enter the commas.

In addition to these graphic symbols, the keyboard graphics are all represented by a word and a letter. The word is either SHFT or CMD and represents the SHIFT key or the Commodore key. The letter is one of the letters on the keyboard. The combination [SHIFT E] would be entered by holding down the SHIFT key and pressing the E. A number following the letter tells you how many times to type the letter. For example, [SHFT A4,CMD B3] would mean to hold the SHIFT key and press the A four times, then hold down the Commodore key and press the B three times.

The following chart tells you the keys to press for any word or words inside of brackets. Refer to this chart whenever you aren't sure what keys to press. The little graphic next to the keystrokes shows you what you will see on the screen.

Syntax Error

This is by far the most common error encountered while entering a program. Usually (sorry folks) this means that you have typed something incorrectly on the line the syntax error refers to. If you get the message "?Syntax Error Break In Line 270," type LIST 270 and press RETURN. This will list line 270 to the screen. Look for any non-obvious mistakes like a zero in place of an O or vice-versa. Check for semicolons and colons reversed and extra or missing parentheses. All of these things will cause a syntax error.

There is only one time a syntax error will tell you the wrong line to look at. If the line the syntax error refers to has a function call (e.g., FN A(3)), the syntax error may be in the line that defines the function, rather than the line named in the error message. Look for a line near the beginning of the program (usually) that has DEF FN A(X) in it with an equation following it. Look for a typo in the equation part of this definition.

Illegal Quantity Error

This is another common error message. This can also be caused by a typing error, but it is a little harder to find. Once again, list the line number that the error message refers to. There is probably a poke statement on this line. If there is, then the error is referring to what is trying to be poked. A number must be in the range of zero to 255 to be poke-able. For example, the statement POKE 1024,260 would produce an illegal quantity error because 260 is greater than 255.

Most often, the value being poked is a variable (A,X...). This error is telling you that this variable is out of range. If the variable is being read from data statements, then the problem is somewhere in the data statements. Check the data statements for missing commas or other typos.

If the variable is not coming from data statements, then the problem will be a little harder to find. Check each line that contains the variable for typing mistakes.

Out Of Data Error

This error message is always related to the data statements in a program. If this error occurs, it means that the program has run out of data items before it was supposed to. It is usually caused by a problem or typo in the data statements. Check first to see if you have left out a whole line of data. Next, check for missing commas between numbers. Reading data from a page of a magazine can be a strain on the brain, so use a ruler or a piece of paper or anything else to help you keep track of where you are as you enter the data.

Other Problems

It is important to remember that the 64 and the PET/CBM computers will only accept a line up to 80 characters long. The VIC 20 will accept a line up to 88 characters long and the 128 a line up to 160 characters long. Sometimes you will find a line in a program that runs over this number of characters. This is not a mistake in the listing. Sometimes programmers get so carried away crunching programs that they use abbreviated commands to get more than the standard number of characters on one line.

"[HOME]" = UNSHIFTED CLR/ HOME
"[CLEAR]" = SHIFTED CLR/HOME
"[DOWN]" = CURSOR DOWN
"[UP]" = CURSOR UP
"[RIGHT]" = CURSOR RIGHT
"[LEFT]" = CURSOR LEFT
"[RVS]" = CONTROL 9
"[RVOFF]" = CONTROL 0
"[BLACK]" = CONTROL 1
"[WHITE]" = CONTROL 2
"[RED]" = CONTROL 3
"[CYAN]" = CONTROL 4
"[PURPLE]" = CONTROL 5
"[GREEN]" = CONTROL 6
"[BLUE]" = CONTROL 7
"[YELLOW]" = CONTROL 8
"[ORANGE]" = COMMODORE 1
"[BROWN]" = COMMODORE 2
"[L. RED]" = COMMODORE 3
"[GRAY1]" = COMMODORE 4
"[GRAY2]" = COMMODORE 5
"[L. GREEN]" = COMMODORE 6
"[L. BLUE]" = COMMODORE 7
"[GRAY3]" = COMMODORE 8
"[F1]" = F1
"[F2]" = F2
"[F3]" = F3
"[F4]" = F4
"[F5]" = F5
"[F6]" = F6
"[F7]" = F7
"[F8]" = F8
"[POUND]" = ENGLISH POUND
"[SHFT ^]" = PI SYMBOL
"[^]" = UP ARROW

GRAPHIC SYMBOLS WILL BE REPRESENTED AS EITHER THE LETTERS SHFT (SHIFT) AND A KEY ("[SHFT Q,SHFT J,SHFT D,SHFT S]") OR THE LETTERS CMDR (COMMODORE) AND A KEY ("[CMDR Q,CMDR G,COMDR Y,CMDR H]"). IF A SYMBOL IS REPEATED, THE NUMBER OF REPITITIONS WILL BE DIRECTLY AFTER THE KEY AND BEFORE THE COMMA ("[SPACE3,SHFT S4,CMDR M2]").

HOW TO ENTER PROGRAMS

You can enter these lines by abbreviating the commands when you enter the line. The abbreviations for BASIC commands are in your user guide.

If you type a line that is longer than the acceptable number of characters, the computer will act as if everything is ok, until you press RETURN. Then, a syntax error will be displayed (without a line number). Many people write that the computer gives them a syntax error when they type the line, or that the computer refuses to accept a line. Both of these problems are results of typing a line that has too many characters.

The Program Won't Run!!

This is the hardest of problems to resolve; no error message is displayed, but the program just doesn't run. This can be caused by many small mistakes typing a program in. First check that the program was written for the computer you are using. Check to see if you have left out any lines of the program. Check each line of the program for typos or missing parts. Finally, press the RUN/STOP key while the program is "running." Write down the line the program broke at and try to follow the program backwards from this point, looking for problems.

If All Else Fails

You've come to the end of your rope. You can't get the program to run and you can't find any errors in your typing. What do you do? As always, we suggest that you try a local user group for help. In a group of even just a dozen members, someone is bound to have typed in the same program. The user group may also have the program on a library disk and be willing to make a copy for you. For $9.95 per issue, you can also get all the BASIC programs in each issue, as well, from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007.

If you do get a working copy, be sure to compare it to your own version so that you can learn from your errors and increase your understanding of programming.

If you live in the country, don't have a local user group, or you simply can't get any help, write to us. If you do write to us, include the following information about the program you are having problems with:

The name of the program
The issue of the magazine it was in
The computer you are using
Any error messages and the line numbers
Anything displayed on the screen
A printout of your listing (if possible)

All of this information is helpful in answering your questions about why a program doesn't work. A letter that simply states "I get an error in line 250 whenever I run the program" doesn't give us much to go on. Send your questions to:

Commodore Magazines
1200 Wilson Drive
West Chester, PA 19380
ATTN: Program Problem

HOW TO USE THE MAGAZINE ENTRY PROGRAMS

The Magazine Entry Programs on the next pages are two BASIC machine language programs that will assist you in entering the programs in this magazine correctly. There are versions for both the Commodore 64 and the Commodore 128. Once the program is in place, it works its magic without you having to do anything else. The program will not let you enter a line if there is a typing mistake on it, and better yet, it identifies the kind of error for you.

Getting Started

Type in the Magazine Entry Program carefully and save it as you go along (just in case). Once the whole program is typed in, save it again on tape or disk. Now RUN the program. The word POKING will appear on the top of the screen with a number. The number will increment from 49152 up to 49900 (4864-5545 on the 128) and just lets you know that the program is running. If everything is ok, the program will finish running and say DONE. Then type NEW. If there is a problem with the data statements, the program will tell you where to find the problem. Otherwise the program will say "mistake in data statements." Check to see if commas are missing, or if you have used periods instead of commas. Also check the individual data items.

Once the program has run, it is in memory ready to go. To activate the program type SYS49152 (SYS4864 on the 128), and press RETURN. You are now ready to enter the programs from the magazine. To disable the Entry Program, just type KILL (RETURN) on the 64 or SYS4867 on the 128.

The checksums for each line are the same for both the 64 and 128, so you can enter your 64 programs on the 128 if you'd like.

Typing the Programs

All the BASIC program listings in this magazine that are for the 64 or 128 have an apostrophe followed by four letters at the end of the line (e.g., 'ACDF). If you plan to use the Magazine Entry Program to enter your programs, the apostrophe and letters **should** be entered along with the rest of the line. This is a checksum that the Magazine Entry Program uses.

Enter the line and the letters at the end and then press RETURN, just as you normally would.

If the line is entered correctly, a bell is sounded and the line is entered into the computer's memory (without the characters at the end).

If a mistake was made while entering the line, a noise is sounded and an error message is displayed. Read the error message, then press any key to erase the message and correct the line.

IMPORTANT

If the Magazine Entry Program sees a mistake on a line, it **does not** enter that line into memory. This makes it impossible to enter a line incorrectly.

Error Messages and What They Mean

There are five error messages that the Magazine Entry Program uses. Here they are, along with what they mean and how to fix them.

Continued next page

HOW TO USE THE MAGAZINE ENTRY PROGRAMS

NO CHECKSUM: This means that you forgot to enter the apostrophe and the four letters at the end of the line. Move the cursor to the end of the line you just typed and enter the checksum.

QUOTE: This means that you forgot (or added) a quote mark somewhere in the line. Check the line in the magazine and correct the quote.

KEYWORD: This means that you have either forgotten a command or spelled one of the BASIC keywords (GOTO, PRINT. .) incorrectly. Check the line in the magazine again and check your spelling.

OF CHARACTERS: This means that you have either entered extra characters or missed some characters. Check the line in the magazine again. This error message will also occur if you misspell a BASIC command, but create another keyword in doing so. For example, if you misspell PRINT as PRONT, the 64 sees the letter P and R, the BASIC keyword ON and then the letter T. Because it sees the keyword ON, it thinks you've got too many characters, instead of a simple misspelling. Check spelling of BASIC commands if you can't find anything else wrong.

UNIDENTIFIED: This means that you have either made a simple spelling error, you typed the wrong line number, or you typed the checksum incorrectly. Spelling errors could be the wrong number of spaces inside quotes, a variable spelled wrong, or a word misspelled. Check the line in the magazine again and correct the mistake.

MAGAZINE ENTRY PROGRAM—64

The Magazine Entry Programs are available on disk, along with the other programs in this magazine, for $9.95. To order, contact Loadstar at 1-800-831-2694.

```
10 PRINT"[CLEAR]POKING -";
20 P=49152 :REM $C000  (END AT
   49900/$C2EC)
30 READ A$:IF A$="END"THEN 110
40 L=ASC(MID$(A$,2,1))
50 H=ASC(MID$(A$,1,1))
60 L=L-48:IF L>9 THEN L=L-7
70 H=H-48:IF H>9 THEN H=H-7
80 PRINT"[HOME,RIGHT12]"P;
90 IF H>15 OR L>15 THEN PRINT
   :PRINT"DATA ERROR IN LINE";
   1000+INT((P-49152)/8):STOP
100 B=H*16+L:POKE P,B:T=T+B:P=P+1
   :GOTO 30
110 IF T<>86200 THEN PRINT
   :PRINT"MISTAKE IN DATA --> CHECK
   DATA STATEMENTS":END
120 PRINT"DONE":END
1000 DATA 4C,1F,C0,00,00,00,00,00
1001 DATA 00,00,00,00,00,0D,00,21
1002 DATA C1,27,C1,2F,C1,3F,C1,4C
1003 DATA C1,EA,EA,EA,4C,54,C0,A2
1004 DATA 05,BD,19,C0,95,73,CA,10
1005 DATA F8,60,60,A0,03,B9,00,02
1006 DATA D9,04,C1,D0,F5,88,10,F5
1007 DATA A0,05,B9,A2,E3,99,73,00
1008 DATA 88,10,F7,A9,00,8D,18,D4
1009 DATA 4C,EF,C0,E6,7A,D0,02,E6
1010 DATA 7B,4C,79,00,A5,9D,F0,F3
1011 DATA A5,7A,C9,FF,D0,ED,A5,7B
1012 DATA C9,01,D0,E7,20,2B,C0,AD
1013 DATA 00,02,20,74,C0,90,DC,A0
1014 DATA 00,4C,A9,C1,C9,30,30,06
1015 DATA C9,3A,10,02,38,60,18,60
1016 DATA C8,B1,7A,C9,20,D0,03,C8
1017 DATA D0,F7,B1,7A,60,18,C8,B1
1018 DATA 7A,F0,37,C9,22,F0,F5,6D
1019 DATA 03,C0,8D,03,C0,AD,04,C0
1020 DATA 69,00,8D,04,C0,4C,8E,C0
1021 DATA 18,6D,05,C0,8D,05,C0,90
1022 DATA 03,EE,06,C0,EE,09,C0,4C
1023 DATA CE,C1,18,6D,08,C0,8D,08
1024 DATA C0,90,03,EE,07,C0,EE,0A
1025 DATA C0,60,0A,A8,B9,0F,C0,85
1026 DATA FB,B9,10,C0,85,FC,A0,00
1027 DATA A9,12,20,D2,FF,B1,FB,F0
1028 DATA 06,20,D2,FF,C8,D0,F6,20
1029 DATA BC,C2,20,E4,FF,F0,FB,A0
1030 DATA 18,B9,08,C1,20,D2,FF,88
1031 DATA 10,F7,68,68,A9,00,8D,00
1032 DATA 02,4C,74,A4,4B,49,4C,4C
1033 DATA 91,91,0D,20,20,20,20,20
1034 DATA 20,20,20,20,20,20,20,20
1035 DATA 20,20,20,20,20,20,20,91
1036 DATA 0D,51,55,4F,54,45,00,4B
1037 DATA 45,59,57,4F,52,44,00,23
1038 DATA 20,4F,46,20,43,48,41,52
1039 DATA 41,43,54,45,52,53,00,55
1040 DATA 4E,49,44,45,4E,54,49,46
1041 DATA 49,45,44,00,4E,4F,20,43
1042 DATA 48,45,43,4B,53,55,4D,00
1043 DATA C8,B1,7A,D0,FB,84,FD,C0
1044 DATA 09,10,03,4C,84,C1,88,88
1045 DATA 88,88,88,B1,7A,C9,27,D0
1046 DATA 13,A9,00,91,7A,C8,A2,00
1047 DATA B1,7A,9D,3C,03,C8,E8,E0
1048 DATA 04,D0,F5,60,A9,04,4C,CA
1049 DATA C0,A0,00,B9,00,02,99,40
1050 DATA 03,F0,F0,C8,D0,F5,A0,00
1051 DATA B9,40,03,F0,E6,99,00,02
1052 DATA C8,D0,F5,20,96,C1,4C,12
1053 DATA C2,A0,09,A9,00,99,03,C0
1054 DATA 8D,3C,03,88,10,F7,A9,80
1055 DATA 85,02,A0,00,20,58,C1,20
1056 DATA 89,C1,20,ED,C1,E6,7A,E6
1057 DATA 7B,20,7C,A5,A0,00,20,80
1058 DATA C0,F0,D0,24,02,F0,06,4C
1059 DATA A8,C0,4C,CE,C1,C9,22,D0
1060 DATA 06,20,8D,C0,4C,CE,C1,20
1061 DATA BA,C0,4C,CE,C1,A0,00,B9
1062 DATA 00,02,20,74,C0,C8,90,0A
1063 DATA 18,6D,07,C0,8D,07,C0,4C
1064 DATA EF,C1,88,A2,00,B9,00,02
1065 DATA 9D,00,02,F0,04,E8,C8,D0
1066 DATA F4,60,18,AD,09,C0,69,41
1067 DATA 8D,09,C0,38,AD,0A,C0,E9
1068 DATA 19,90,06,8D,0A,C0,4C,1C
1069 DATA C2,AD,0A,C0,69,41,8D,0A
```

```
1070 DATA CØ,AD,Ø3,CØ,6D,Ø5,CØ,48
1071 DATA AD,Ø4,CØ,6D,Ø6,CØ,8D,ØC
1072 DATA CØ,68,6D,Ø8,CØ,8D,ØB,CØ
1073 DATA AD,ØC,CØ,6D,Ø7,CØ,8D,ØC
1074 DATA CØ,38,E9,19,9Ø,Ø6,8D,ØC
1075 DATA CØ,4C,52,C2,AD,ØC,CØ,69
1076 DATA 41,8D,ØC,CØ,AD,ØB,CØ,E9
1077 DATA 19,9Ø,Ø6,8D,ØB,CØ,4C,67
1078 DATA C2,AD,ØB,CØ,69,41,8D,ØB
1079 DATA CØ,AØ,Ø1,AD,Ø9,CØ,CD,3C
1080 DATA Ø3,DØ,2Ø,C8,AD,ØA,CØ,CD
1081 DATA 3D,Ø3,DØ,17,C8,AD,ØB,CØ
1082 DATA CD,3E,Ø3,DØ,ØE,AD,ØC,CØ
1083 DATA CD,3F,Ø3,DØ,Ø6,2Ø,CC,C2
1084 DATA 4C,4B,CØ,98,48,68,4C,CA
1085 DATA CØ,A9,2Ø,8D,ØØ,D4,8D,Ø1
1086 DATA D4,A9,Ø9,8D,Ø5,D4,A9,ØF
1087 DATA 8D,18,D4,6Ø,2Ø,A9,C2,A9
1088 DATA 81,2Ø,DF,C2,A9,8Ø,2Ø,DF
1089 DATA C2,4C,D9,C2,2Ø,A9,C2,A9
1090 DATA 11,2Ø,DF,C2,A9,1Ø,2Ø,DF
1091 DATA C2,A9,ØØ,8D,Ø4,D4,6Ø,8D
1092 DATA Ø4,D4,A2,7Ø,AØ,ØØ,88,DØ
1093 DATA FD,CA,DØ,FA,6Ø,END
```

END

MAGAZINE ENTRY PROGRAM—128

```
5 TRAP 2ØØ
10 PRINT"[CLEAR]POKING -";
20 P=4864 :REM $13ØØ  (END AT
   5545/$15A9)
30 READ A$:IF A$="END"THEN 11Ø
80 PRINT"[HOME,RIGHT12]"P;
100 B=DEC(A$):POKE P,B:T=T+B:P=P+1
   :GOTO 3Ø
110 IF T<>59311 THEN PRINT
   :PRINT"MISTAKE IN DATA --> CHECK
   DATA STATEMENTS":END
120 PRINT"DONE":END
200 PRINT:PRINT"DATA ERROR IN LINE";
   1ØØØ+INT((P-4864)/8):END
1000 DATA 4C,1E,13,4C,3A,13,ØØ,ØØ
1001 DATA 8E,ØØ,F7,ØØ,42,41,51,57
1002 DATA ØD,ØØ,ØD,43,Ø8,14,ØE,14
1003 DATA 16,14,26,14,33,14,A9,ØØ
1004 DATA 8D,ØØ,FF,AD,Ø4,Ø3,8D,12
1005 DATA 13,AD,Ø5,Ø3,8D,13,13,A2
1006 DATA 4A,AØ,13,8E,Ø4,Ø3,8C,Ø5
1007 DATA Ø3,6Ø,AD,12,13,8D,Ø4,Ø3
1008 DATA AD,13,13,8D,Ø5,Ø3,6Ø,6C
1009 DATA 12,13,A5,7F,DØ,F9,AD,ØØ
1010 DATA Ø2,2Ø,5B,13,9Ø,F1,AØ,ØØ
1011 DATA 4C,6F,14,C9,3Ø,3Ø,Ø6,C9
1012 DATA 3A,1Ø,Ø2,38,6Ø,18,6Ø,C8
1013 DATA B1,3D,C9,2Ø,DØ,Ø3,C8,DØ
1014 DATA F7,B1,3D,6Ø,18,C8,B1,3D
1015 DATA FØ,35,C9,22,FØ,F5,6D,Ø6
1016 DATA 13,8D,Ø6,13,AD,Ø7,13,69
1017 DATA ØØ,8D,Ø7,13,4C,75,13,18
1018 DATA 6D,Ø8,13,8D,Ø8,13,9Ø,Ø3
1019 DATA EE,Ø9,13,EE,ØC,13,6Ø,18
1020 DATA 6D,ØB,13,8D,ØB,13,9Ø,Ø3
1021 DATA EE,ØA,13,EE,ØD,13,6Ø,ØA
1022 DATA A8,B9,14,13,85,FB,B9,15
1023 DATA 13,85,FC,AØ,ØØ,8C,ØØ,FF
1024 DATA A9,12,2Ø,D2,FF,B1,FB,FØ
1025 DATA Ø6,2Ø,D2,FF,C8,DØ,F6,2Ø
1026 DATA 79,15,2Ø,A3,15,2Ø,E4,FF
1027 DATA FØ,FB,AØ,1B,B9,EF,13,2Ø
1028 DATA D2,FF,88,1Ø,F7,68,68,A9
1029 DATA ØØ,8D,ØØ,Ø2,4C,B7,4D,91
1030 DATA 91,ØD,2Ø,2Ø,2Ø,2Ø,2Ø,2Ø
1031 DATA 2Ø,2Ø,2Ø,2Ø,2Ø,2Ø,2Ø,2Ø
1032 DATA 2Ø,2Ø,2Ø,2Ø,2Ø,2Ø,91,ØD
1033 DATA 51,55,4F,54,45,ØØ,4B,45
1034 DATA 59,57,4F,52,44,ØØ,23,2Ø
1035 DATA 4F,46,2Ø,43,48,41,52,41
1036 DATA 43,54,45,52,53,ØØ,55,4E
1037 DATA 49,44,45,4E,54,49,46,49
1038 DATA 45,44,ØØ,4E,4F,2Ø,43,48
1039 DATA 45,43,4B,53,55,4D,ØØ,C8
1040 DATA B1,3D,DØ,FB,CØ,Ø6,1Ø,Ø3
1041 DATA 4C,69,14,88,88,88,88,88
1042 DATA B1,3D,C9,27,DØ,13,A9,ØØ
1043 DATA 91,3D,C8,A2,ØØ,B1,3D,9D
1044 DATA ØØ,ØB,C8,E8,EØ,Ø4,DØ,F5
1045 DATA 6Ø,4C,5C,15,4C,C5,14,AØ
1046 DATA Ø9,A9,ØØ,99,Ø6,13,8D,ØØ
1047 DATA ØB,88,1Ø,F7,A9,8Ø,85,FD
1048 DATA AØ,ØØ,2Ø,3F,14,2Ø,AE,14
1049 DATA 2Ø,ØD,43,84,FA,AØ,FF,2Ø
1050 DATA 67,13,FØ,D8,24,FD,FØ,Ø6
1051 DATA 2Ø,8F,13,4C,8F,14,C9,22
1052 DATA DØ,Ø6,2Ø,74,13,4C,8F,14
1053 DATA 2Ø,9F,13,4C,8F,14,AØ,ØØ
1054 DATA B9,ØØ,Ø2,2Ø,5B,13,C8,9Ø
1055 DATA ØA,18,6D,ØA,13,8D,ØA,13
1056 DATA 4C,BØ,14,88,6Ø,18,AD,ØC
1057 DATA 13,69,41,8D,ØC,13,38,AD
1058 DATA ØD,13,E9,19,9Ø,Ø6,8D,ØD
1059 DATA 13,4C,CF,14,AD,ØD,13,69
1060 DATA 41,8D,ØD,13,AD,Ø6,13,6D
1061 DATA Ø8,13,48,AD,Ø7,13,6D,Ø9
1062 DATA 13,8D,ØF,13,68,6D,ØB,13
1063 DATA 8D,ØE,13,AD,ØF,13,6D,ØA
1064 DATA 13,8D,ØF,13,38,E9,19,9Ø
1065 DATA Ø6,8D,ØF,13,4C,Ø5,15,AD
1066 DATA ØF,13,69,41,8D,ØF,13,AD
1067 DATA ØE,13,E9,19,9Ø,Ø6,8D,ØE
1068 DATA 13,4C,1A,15,AD,ØE,13,69
1069 DATA 41,8D,ØE,13,AØ,Ø1,AD,ØC
1070 DATA 13,CD,ØØ,ØB,DØ,2Ø,C8,AD
1071 DATA ØD,13,CD,Ø1,ØB,DØ,17,C8
1072 DATA AD,ØE,13,CD,Ø2,ØB,DØ,ØE
1073 DATA AD,ØF,13,CD,Ø3,ØB,DØ,Ø6
1074 DATA 2Ø,89,15,A4,FA,6Ø,98,48
1075 DATA 68,4C,AF,13,A9,Ø4,4C,AF
1076 DATA 13,A9,ØØ,8D,ØØ,FF,A9,2Ø
1077 DATA 8D,ØØ,D4,8D,Ø1,D4,A9,Ø9
1078 DATA 8D,Ø5,D4,A9,ØF,8D,18,D4
1079 DATA 6Ø,2Ø,61,15,A9,81,2Ø,9C
1080 DATA 15,A9,8Ø,2Ø,9C,15,4C,96
1081 DATA 15,2Ø,61,15,A9,11,2Ø,9C
1082 DATA 15,A9,1Ø,2Ø,9C,15,A9,ØØ
1083 DATA 8D,Ø4,D4,6Ø,8D,Ø4,D4,A2
1084 DATA 7Ø,AØ,ØØ,88,DØ,FD,CA,DØ
1085 DATA FA,6Ø,END
```

END

Tips & Tricks

Continued from pg. 50

nal jump tables we can get the size of the screen on any Commodore machine that adheres to the jump table conventions.

S=PEEK(PEEK(65518)+PEEK(65519)*256+1)

Kermit R. Woodall
Glen Allen, Virginia

64 Color Flipper: This program allows you to instantaneously change the colors of all text on the screen, just by executing a SYS53049. It works differently with different 64 ROM versions, so you may have to experiment with the numbers you poke into 53086 and 53087 to get the colors you want. On some machines, the colors you end up with depend on the original color of the characters when printed to the screen.

Richard Miu
Address Unknown

```
100 REM COLOR FLIPPER - RICHARD MIU
110 REM SYS53049 FLIPS BETWEEN COLORS
120 REM POKED INTO 53086 AND 53087
130 POKE 53086,0:POKE 53087,1
    :REM WHT/BLK
140 FOR Y=1 TO 37:READ Z:CS=CS+Z:NEXT
    :RESTORE:IF CS<>6031 THEN PRINT"
    [DOWN]DATA ERROR":STOP
150 FOR J=53049 TO 53085:READ K
    :POKE J,K:NEXT
160 DATA 173,094,207,077,095,207,141,
    096
170 DATA 207,169,000,133,251,169,216,
    133
180 DATA 252,162,004,160,000,177,251,
    077
190 DATA 096,207,145,251,200,208,246,
    230
200 DATA 252,202,208,239,096          END
```

64 Delete Right: If you want to delete text to the left of the cursor, you can easily use the DELETE key. But if your target is to the right of the cursor, things aren't so easy. This little program converts the F7 key into a Right Delete key. Run it, then whenever you press F7, text to the right of the cursor will be sucked quickly into oblivion.

The STOP/RESTORE combination disables the feature, but it can be enabled again by executing a SYS680.

Lucy S. Terrier
Alton, Illinois

```
10 REM DELETE RIGHT - LUCY S. TERRIER
15 FOR J=680 TO 725:READ K:CS=CS+K
   :NEXT:RESTORE:IF CS<>4855 THEN
   PRINT"DATA ERROR":END
20 FOR J=680 TO 725:READ K:POKE J,K
   :NEXT
25 PRINT"[DOWN]USE F7 TO DELETE TO
   RIGHT OF CURSOR":SYS 680:END
30 DATA 120,162,181,160,002,142,020,
   003
35 DATA 140,021,003,088,096,072,138,
   072
40 DATA 152,072,165,197,201,003,208,
   014
45 DATA 169,002,133,198,169,029,141,
   119
50 DATA 002,169,020,141,120,002,104,
   168
55 DATA 104,170,104,076,049,234
                                     END
```

64 POP Routine: Here is a simple routine to clean out any unresolved GOSUB-RETURNs or FOR-NEXT loops. I do not recommend the practice of writing programs that need this. But if you must, you must! Just type this in a line in your program where you want to POP:

POKE 38,104:POKE 39,104:POKE 40,76:POKE 41,126:POKE 42,166:SYS 38

After this line executes, all FOR-NEXT loops and GOSUBs will act as if they had finished or been returned from.

Kermit R. Woodall
Glen Allen, Virginia

128 reset changer: If you have a 128 and are going to do a lot of work in 64 mode, do this in 128 mode:

BANK 1 : POKE 65528,77 : POKE 65529,255 : SYS 65357

This changes the operating system vector that determines which mode will be active after a reset. After it is executed, pressing the reset button will put your computer into 64 mode, without your having to hold down the Commodore key. You must turn the computer off and back on to restore the vector and go into 128 or CP/M mode.

Daihung Ho
East Moline, Illinois

TOTAL CONTROL

Continued from pg. 91

```
49 IF Q$=CHR$(20)THEN PRINT"[RVS]
   "L$L$"[RVS] "L$;:X=X-1:NI$(X)=""
   :GOTO 43'JCBV
50 IF Q$<CHR$(32)OR Q$>"]
   "OR Q$=CHR$(34)THEN 45'JQBK
51 IF X=LE+1 AND Q$<>CHR$(13)THEN
   PRINT TAB(X)U$:X=X-1'MSOO
53 IF Q$>CHR$(20)THEN NI$(X)=Q$'FORK
55 PRINT TAB(X)CHR$(18)Q$"[RVS] "L$;
   :NEXT'EMAL
57 PRINT L$"[RVS]?][RVOFF] "
   :FOR X=0 TO LE:C$=C$+NI$(X)
   :NI$(X)="":NEXT:Q$=""'JECV
58 GET Q$:IF Q$=""THEN 58'EHWN
59 IF Q$<>CHR$(133)THEN PRINT U$U$
   :GOTO 40'HOHR
60 RETURN'BAQC
61 REM *** END OF SUBROUTINE ***'BVHJ
62 REM'BARE
63 REM ******************************
   **'BHGK
64 REM *
   *'BCBG
65 REM * LINES 100 - ARE FOR EXAMPLES
   *'BAHO
66 REM *  THEY ARE FOR TESTING ONLY
   *'BXJP
67 REM *  THEY ARE NOT OF THE INPUT
   *'BWKP
68 REM *           SUBROUTINE
   *'BMRN
69 REM ******************************
   **'BHGQ
70 REM'BARD
100 PRINT CHR$(144)" <RETURN> ENDS
    INPUT"'CFGC
101 PRINT"[SPACE5]<F1> ACCEPTS
    INPUT"'BANC
102 PRINT"<ANY KEY> ABORTS
    INPUT"CHR$(5):PRINT:PRINT'EFOG
110 LE=9:PRINT"FIRST NAME"
    :GOSUB 40'DHAC
111 NA$=C$'BFDX
112 LE=12:PRINT"LAST NAME"
    :GOSUB 40'DIHE
113 LA$=C$'BFBA
114 LE=11:PRINT"ACCOUNT NUMBER"
    :GOSUB 40'DIPH
115 AC$=C$'BFRC
116 LE=6:PRINT"AMOUNT":GOSUB 40'DHFH
117 AM=VAL(C$)'CGNF
118 LE=35:PRINT"COMMENT":GOSUB 40'DITJ
119 CO$=C$'BFGG
120 LE=1:PRINT"GRADE":GOSUB 40'DHRB
121 GR$=C$'BFNY
200 PRINT:PRINT:PRINT"FIRST NAME
    : "NA$'DFFC
202 PRINT"LAST[SPACE2]NAME: "LA$'BDPC
203 PRINT"ACCOUNT # : "AC$'BDUD
204 PRINT"AMOUNT[SPACE4]:$"AM'BCYD
205 PRINT"COMMENT[SPACE3]: "CO$'BDKF
206 PRINT"GRADE[SPACE5]: "GR$'BDJF
```

END

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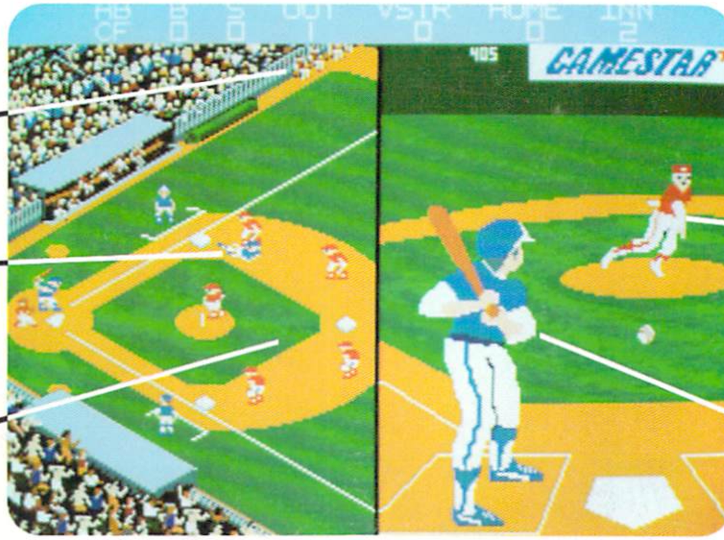
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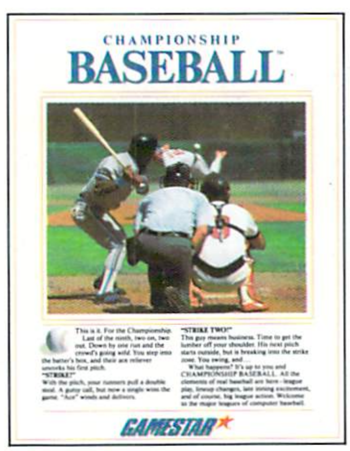
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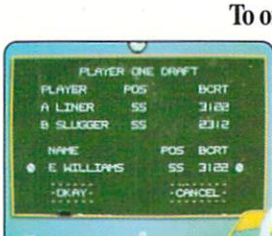
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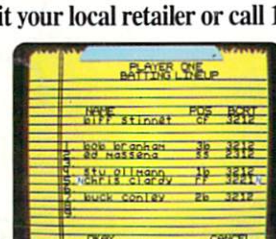
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